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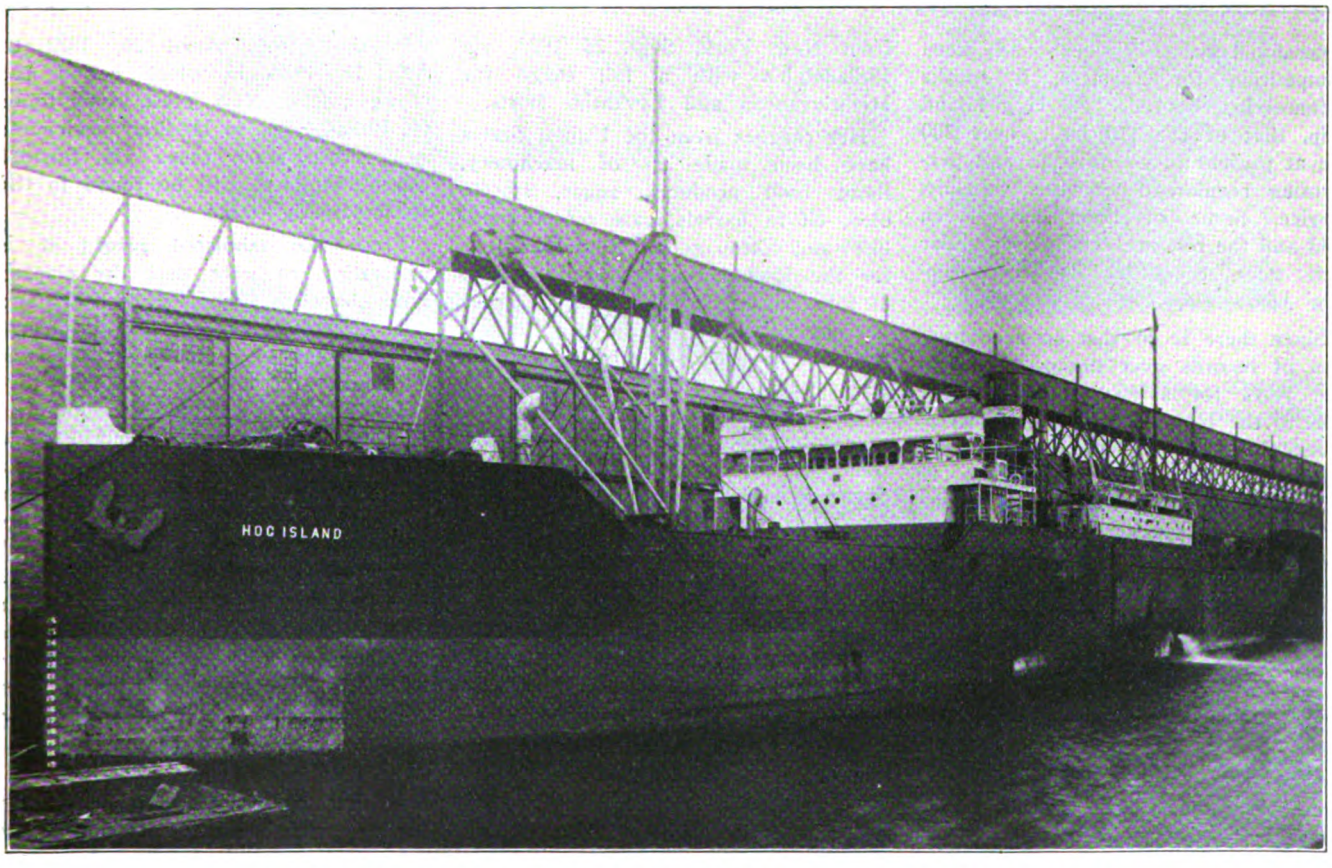
Four Year Log of a War Built Ship

American Freighter Hog Island Entering the Famous Corinth Canal

MUCH has been written in a derogatory sense of the vast merchant fleet constructed and paid for by the United States during and after the great war. Three billion dollars were poured into this enterprise and to be sure many mistakes were made and a great deal of money wasted.

Just criticism may be leveled at lack of judgment and at mistakes made. Any actions on the part of all from those in highest authority to the little negro boy who passed rivets, that savored of cheating in the performance of duty, deserves condemnation and punishment. Those so guilty were in effect traitors to their country since they were engaged in fashioning one of the arms of war as truly as were the soldiers in the field in building their trenches, dug outs and concrete pill boxes in order to overcome the enemy in front of them. Everyone had their job to do. For an arm of war so vitally necessary that had the war continued, no continuous effective participation on the actual fighting fields would have been possible without it the expenditure of so great an amount as $3,000,000,000 was justified even if all of the fleet that was built or begun for the emergency now rested on the bottom of the ocean and this amount written off as a part of the cost of victory.

One of the favorite arguments against the ships built during and shortly after the emergency has been their supposed unsuitability of type and inferior workmanship in hull, motive power, auxiliaries and equipment. In some instances this criticism may be justified, but of many ships built at that time it is not. As an example it is a matter of legitimate pride to all Americans, that the ships built at Hog Island have conclusively proved in service to be excellent ships in every respect. Beginning on Sept. 20, 1917, with a wild waste of marsh and morass on the Delaware river there was constructed on this site through the extremely bitter winter of 1917-1918 a huge shipyard fully equipped for assembling and erecting ships. Fifty complete ways in groups of 10 each, a wet basin with seven docks, shops, power house, buildings, railroad trackage, cranes; storage yards and all the paraphernalia of a tremendous assembling shipbuilding plant was constructed in time so that it was possible to lay the keel of the first ship on Feb. 12, 1918; to deliver two complete ships before the end of 1918; to complete three more and launch nine additional, with ships under construction in various stages of completion



UNLOADING CARGO FROM MEDITERRANEAN AND LEVANTINE PORTS AT BOSTON

on each one of the 50 ways, 10 of these hulls 80 per cent or more completed, all by Jan. 30, 1919. This was a colossal task which, it is safe to say could not have been accomplished by any other nation.

A Popular Fleet

The cargo ships of the "A" type completed at Hog Island have proved to be good ships. Many of them have now been in service four years and have passed through their first classification survey with great credit to the builders of both hull and machinery and to the operators for their present excellent condition. In these times of a superabundance of ships and keen competition for business, it speaks volumes for the type "A" Hog Island ship, that of the 110 built, over 100 are at present in commission and performing regular, dependable, valuable, service. Some of them have been sold and the rest are extremely popular with those companies operating shipping board ships.

Since there is so vast an accumulation of records over the past four to five years for a fleet of the magnitude of the Hog Island ships in service it may be useful and interesting for the sake of clarity and definiteness to follow the fortunes and the performance of a specific ship. For this purpose the steamer HOG ISLAND has been chosen. This particular ship was selected not because she is the best of the type (the QUISTCONCK the first of these ships, delivered Dec. 3, 1918 has been and is now operating successfully, having recently completed a voyage from New Orleans to the Mediterranean and return) but rather because her record of continuous dependable service typically represents a fair average of performance for the fleet. Furthermore, the HOG ISLAND has been operated by the same company, the Export Steamship Corp., 25 Broadway, New York, continuously since her trial trip, Oct. 10, 1919, and therefore the responsibility for her record and present condition rests with this company alone.

The HOG ISLAND has completed 13 voyages from New York, some of them via Philadelphia to Mediterranean and Levantine ports such as Candia, Malta, Alexandria, Piraeus, Salonica, Kavala, Patras and Kalamata, returning to New York some times via Boston. She ended her thirteenth voyage in New York, Aug. 18, 1923 and sailed on her fourteenth voyage from New York, Sept. 25 1923, via Philadelphia with a full cargo for Mediterranean and Levantine ports.

Her cargoes from the United States have been made up of machinery, flour, food products, sugar, starch, oleo, oil in barrels, case oil, automobiles and cotton goods. Return cargoes for the United States have consisted of tobacco, currants, figs, raisins, olive oil, olives, onions, turkish rugs, opium, furs and a great deal of cotton. On her voyage No. 11, the HOG ISLAND brought into Boston over 14,400 bales of cotton, the largest cargo of this commodity ever shipped into the United States in an American ship.

Assists Refugees

When the Turkish soldiers occupied and set fire to Smyrna, Capt. M. E. Broman of the HOG ISLAND, then at anchor in the harbor, joined American officers from the destroyer LAWRENCE in going ashore to investigate conditions with the view of deciding on such steps as might be necessary to protect American interests and to render all possible aid to the population. At this crisis the HOG ISLAND stood by, completely at the service and under orders of the American naval commander in charge ready to aid in evacuating the people of the burning city. She was not needed as it turned out but she was there and ready and in the competent hands of officers and men of the American merchant marine.

Performance in Service

From the above it may be seen that this American emergency built merchantman now just a little over four years old has had regular, steady employment, an honorable efficient career comparable with that of any merchant ship under foreign flags.

Specific performance records for this ship, from April 26, 1922 to Aug. 18, 1923, in which period five voyages, from New York, some times via Philadelphia, to Mediterranean ports and return some times via Boston, were completed, will be found in the accompanying table.

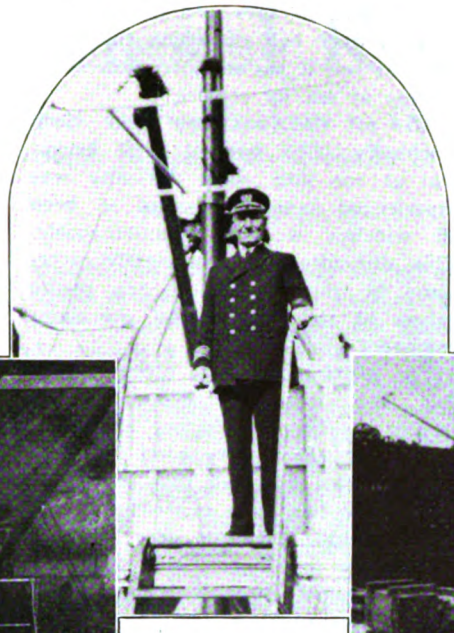
From the tabulated record it is interesting to note that the elapsed time between April 26, 1922 and Aug. 18, 1923 in which five complete voyages were made is 478 days, 20 hours and nine minutes. Of that time, 242 days, 2 hours, nine minutes or 50.6 per cent was spent at sea, 141 days, 18 hours, 0 minutes or 29.6 per cent was spent at out ports, and 95 days or 19.8 per cent in her home port. The total distance covered, 58,272 miles and the total fuel consumed at sea, 46,672 barrels, gives an average of 1.248 miles per barrel or 8.324 miles per ton of oil over the 16-month period under consideration.

On her last stay in New York between Aug. 18 and Sept. 25 the HOG ISLAND underwent her No. 1 classification survey, nearly four years having passed since her completion. The repairs required were very small and could hardly be called major.

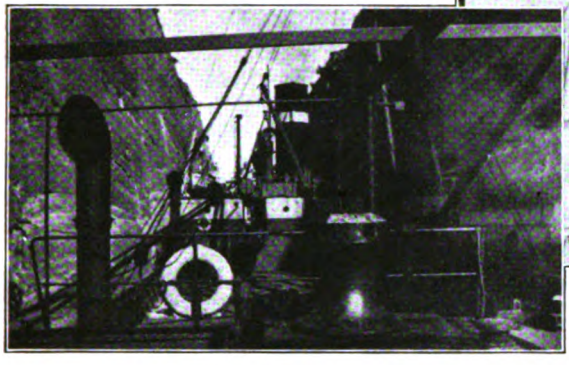
Performance Record of War Built Ship in Transatlantic Service

Voyage No.	9	10	11	12	13
Dates	April 26, 1922, to July 7, 1922	Aug. 8, 1922 to Nov. 6, 1922	Nov. 22, 1922 to Feb. 23, 1923	Mar. 14, 1923 to May 12, 1923	June 9, 1923 to Aug. 18, 1923
Ports	N. Y., Medit., Boston, N. Y.	N. Y., Phila. Medit., Boston, N. Y.	N. Y., Medit., Boston, N. Y.	N. Y., Medit., N. Y.	N. Y., Medit., N. Y.
Total time	72d. 0h. 0m	89d. 20h. 55m.	92d. 2h. 26m.	59d. 19h. 18m.	70d. 1h. 30m.
Time at sea, port to port	47d. 20h. 32m.	49d. 21h. 31m.	52d. 21h. 14m.	45d. 1h. 0m.	46d. 9h. 52m.
Distance covered, port to port, miles	11,828	11,888	11,611	11,660	11,285
Average speed, miles	10.2	9.9	9.1	10.78	10.13
Rev. per min. av.	81.3	82.6	79.1	84.5	86.0
Apparent slip, per cent	7.5	12	15	6.6	10
Fuel per day at sea, barrels	188	200	191	194.1	192.8
Miles per ton fuel	8.74	7.92	7.71	9.04	8.48
Time in port	24d. 3h. 28m.	39d. 23h. 24m.	39d. 5h. 12m.	14d. 18h. 18m.	23d. 15h. 38m.
Fuel per day in port, barrels	40	45	73	57.1	43
Total fuel used on voyage, barrels	9,931	11,774	12,970	9,540	9,944
Water consumed per day in port, tons	21	13.8	27.8	13.8	19.5
Water consumed per day at sea, tons	12.2	12.6	14	13.7	12

Passing through Corinth canal, Greece. Cut through sand stone, the top width is 92 feet, bottom width 72 feet with sheer sides in places of 200 feet.



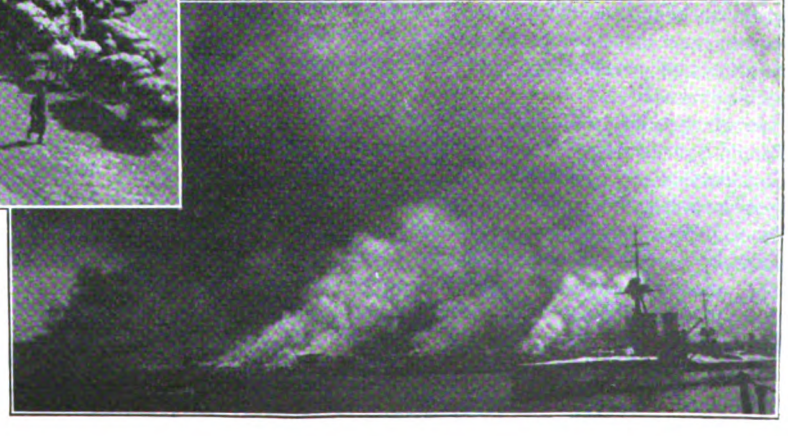
Capt. M. E. Broman on the bridge of the American freighter Hog Island which has been operating successfully in foreign trade. Below steamer at Alexandria, Egypt.



Steamer Hog Island at Smyrna where she stood by to give aid to the refugees during the Turk-Greek warfare. At sides, Chief Engineer James Breen aboard ship and at Athens.

Smoke from burning Smyrna obscuring S. S. Hog Island and one of her sister ships.

Loading cotton at Alexandria, the S. S. Hog Island recently bringing to Boston the largest cotton cargo ever entering this country on an American ship.



In the main machinery consisting of General Electric Curtis type turbines and reduction gears the buckets on the first stage of the turbine rotors were partly renewed on account of natural erosion by the steam during the past four years. The original gears are still in place and needed no repairs nor replacements.

According to direct information from the chief engineer, the Babcock & Wilcox water tube boilers and Foster superheaters, needed only the regular routine attention and are in fine condition. He reported they had given excellent service.

In regard to the danger of salting the boilers, the chief engineer has had no difficulty and he considers the attention required to prevent their doing so in the nature of an excellent safety appliance, as the salt that would hurt these boilers and which would not be serious in Scotch boilers would be damaging to the turbine. In the last five voyages in a period of 16 months, over half of which time was spent at sea, it has not been necessary to stop at sea for repairs.

All of the auxiliary and deck machinery have worked well except that at one time some difficulty was experienced supplying steam to keep all winches working simultaneously. This difficulty was completely overcome by the renewal of the piston valves in the winches by the ships engineers while at sea.

The captain and chief officer report that their experience with the HOG ISLAND has been satisfactory and specifically that she is very good in a seaway, handles well and that practically no trouble has been experienced with her telemotor steering gear or with the anchor windlass. No cargo has been damaged through leaks or any fault of the ship.

As a proof of confidence in her seaworthiness and the manner of her handling, it is interesting to note that the HOG ISLAND was the first to receive preferential treatment by the Salvage Association in the matter of insurance premiums, placing her on a parity with the best foreign ships.

The only criticism the chief officer could think of was that her decks are flat (it was necessary to do away with camber to facilitate fabrication as distinct from building) and the water does not run off readily. It was noted in an inspection of the ship, however, that the decks are in an excellent state of preservation and in fact the entire structure of the ship shows no signs of deterioration.

The above account it is hoped will be received as it is intended—as a fair, unbiased account of the history of one freighter of the American merchant marine representing a large block of useful and dependable ships built as the result of the exigencies and pressure of war.

New Orders Keep Pacific Yards Busy

SHIPYARDS along the entire Pacific coast have more work on hand at present than at any time during the last three years. This is particularly true of the wood yards on Puget sound which during the first nine months of this year have had more new construction and repair work than during 1921 and 1922 combined. Work at the Seattle wood yards during the nine months ended Sept. 30 is estimated at $2,000,000. In addition to numerous small tenders, scows and other equipment for logging, lumber and fishing companies, the wood yards on Puget sound are at present building 12 wood halibut fishermen. These range from 50 to 90 feet in length and each is to have diesel or semidiesel engines.

Todd Dry Docks, Inc., has received a $50,000 repair job on the oil tanker TEJON which was damaged in collision. Thirty plates were damaged, some requiring renewal. This contract took three weeks to complete. The same plant during the last month has completed several docking and overhauling jobs on transpacific vessels.

In competition with both Atlantic and Pacific yards, the Todd Drydock & Construction Co., Tacoma, Wash., has been awarded the contract for constructing a 7000-ton steel passenger and freight steamer for the Southern Pacific line. The vessel is intended for service between New Orleans and New York. President J. A. Eaves, of the Tacoma company, states that work will begin about Dec. 1. The contract calls for a first-class steamer 445 feet in length, 57 feet beam, load draft 28 feet. Power will be furnished by a turbine driving a single screw and giving a speed of 18 knots.

The Canadian Pacific railroad is reported to have placed contracts for four steel passenger vessels to ply on the route between Seattle, Vancouver and Victoria, B. C.

One of the largest reconditioning and alteration jobs awarded on the Pacific coast in recent months has been taken by Todd Dry Docks, Inc., Seattle, at whose yard the auxiliary steel schooner MOONLITE will be prepared for service. Competing successfully against nine other yards, the Seattle plant was given the award at $131,000, time 75 days. The MOONLITE, DAWNLITE and DAYLITE were purchased from the Standard Oil Co. by the Pacific Steamship Co. The new owners are planning to remodel the vessels to fit them for economical operation in the coasting trade. The MOONLITE will be equipped with twin 500-horsepower McIntosh & Seymour diesel engines taken from the motorship BENOWA. The other two steel vessels will later undergo similar changes, auxiliary equipment, taken from wooden motorships owned by the same company to be installed. Two hundred additional workmen will be added to the yard as a result of this contract.

With orders to complete the navy scout cruiser CINCINNATI as rapidly as possible, the Todd Drydock & Construction Corp., recently increased its working force at Tacoma by 150 men. The CINCINNATI is the third and last cruiser to be delivered under a contract awarded less than two years ago.

Repaired at Yarrows, Inc., Esquimalt, B. C., at a cost of close to $200,000, the British steamship SIBERIAN PRINCE has been redelivered to her owners and loaded cargo at north Pacific ports for Europe. The vessel was damaged in July by running aground.

The Matson Navigation Co. announces that within six months bids will be invited for constructing a $6,000,000 passenger and freight liner for service between the Pacific coast and the Hawaiian islands. The new steamer is to have a speed of about 21 knots and accommodations for 500 first-class passengers. Three types of motive power will be considered, diesel, turbine-electric and steam turbine. Pacific coast builders, it is stated, will be afforded every opportunity to compete with the larger eastern yards.

The Alaska Consolidated Canneries has purchased from the Lake Union Drydock & Machine Works the wood shipbuilding plant at Houghton, Lake Washington, outside of Seattle. It is planned to operate this yard at increased capacity, catering especially to the fishing industry.

Pillsbury & Curtis, San Francisco marine surveyors, have been awarded the contract for salvaging all movable parts and equipment of the seven navy destroyers which were wrecked off the southern California coast in September.

Change to Diesel Reduces Costs

Conversion of Two Tankers to Diesel Drive Has Proved Successful—Details of Changes

BY ROBERT HAIG

IN CONSIDERING the question, building motorships, or converting steamships to diesel motor-driven ships, American shipbuilders and shipowners have had a peculiar situation to deal with.

The shipping board owned and held for disposal an enormous number of ships, most of which had been constructed during the war or immediately succeeding the war, and which were more or less acceptable as merchant ships in the ordinary run of business.

(*a*) Leaving out of consideration the ships of 500 feet or over, what the shipowner had to choose from were straight cargo boats, also oil tankers, ranging all the way from 3500 deadweight to 12,500 deadweight tons, single-screw type, fitted with steam turbines, reduction gears, watertube boilers; steam turbines, reduction gears, Scotch boilers; triple expansion steam engines, watertube boilers; and triple expansion steam engines with Scotch boilers.

(*b*) A few ships were built of the twin-screw type, but these were early disposed of and did not enter into the large mass of ships that were still on the market for sale under various conditions of purchase and operation.

Owing to the conditions arising in the oil industry during the latter part of 1922 and the first half year of 1923, a very firm market developed for oil tankers for a time, affording the shipping board an opportunity to dispose of probably 60 per cent of the then existing fleet of tankers at a price that no shipbuilder, either here or elsewhere could ever hope to duplicate, but probably the prices obtained were a good trade considering how many tankers the shipping board had on hand, and the further fact that it had no trade of its own for those ships, and also that ships of this type were almost entirely owned by those firms who were engaged in the oil business.

The number of tankers sold has relieved the pressure on the market for that type of boat and results have demonstrated the fact that, with a general increase of this business, the tanker market will shortly be found to be very bare of tonnage.

One of the first questions we had to consider on the conversion of an oil tanker to motor drive was whether the vessel should be arranged for diesel electric-driven auxiliaries or adopt steam auxiliaries by retaining one of the main boilers and such of the present steam auxiliaries as were suitable for the new conditions. The arrangement with steam auxiliaries reduces the cost of conversion if the units already on board are in good condition and can be worked into the new scheme of things found on a diesel motor-driven ship, but such an arrangement, while it shows very gratifying results in economy of operation and a certain reduction in cost of conversion, can hardly be expected to give such favorable returns as we have a right to expect will be obtained in a more complete diesel unit.

Change in Tanker Design

I have no hesitation in stating, however, there are indications that as new tankers are laid down the requirements for large boiler power for pumping out cargo will be dispensed with, and tankers will be built with main diesel motors and auxiliary motors, coupled to electric generators, with cargo pumps driven by electric motors, and such heating as may be required for fuel will be obtained from an auxiliary heating generator, deriving its heat from the waste gases from the main and auxiliary motors.

When the shipowner who handles cargo and passenger ships deals with the question of fitting diesel motors, he is not immediately concerned with the consideration of retaining boiler power, beyond such small power as might be required for purposes of heating, which is only a minor matter.

In dealing with a general cargo boat, the same considerations have not had to be given to cargo handling as in the tanker, as we have no difficulty in obtaining electric-driven winches, windlass and steering gears of the highest type, which we have every reason to believe will be found much more economical in maintenance. With the electric auxiliaries, steam for power purposes can be entirely eliminated, and we thereby obtain the best conditions for a diesel motor installation.

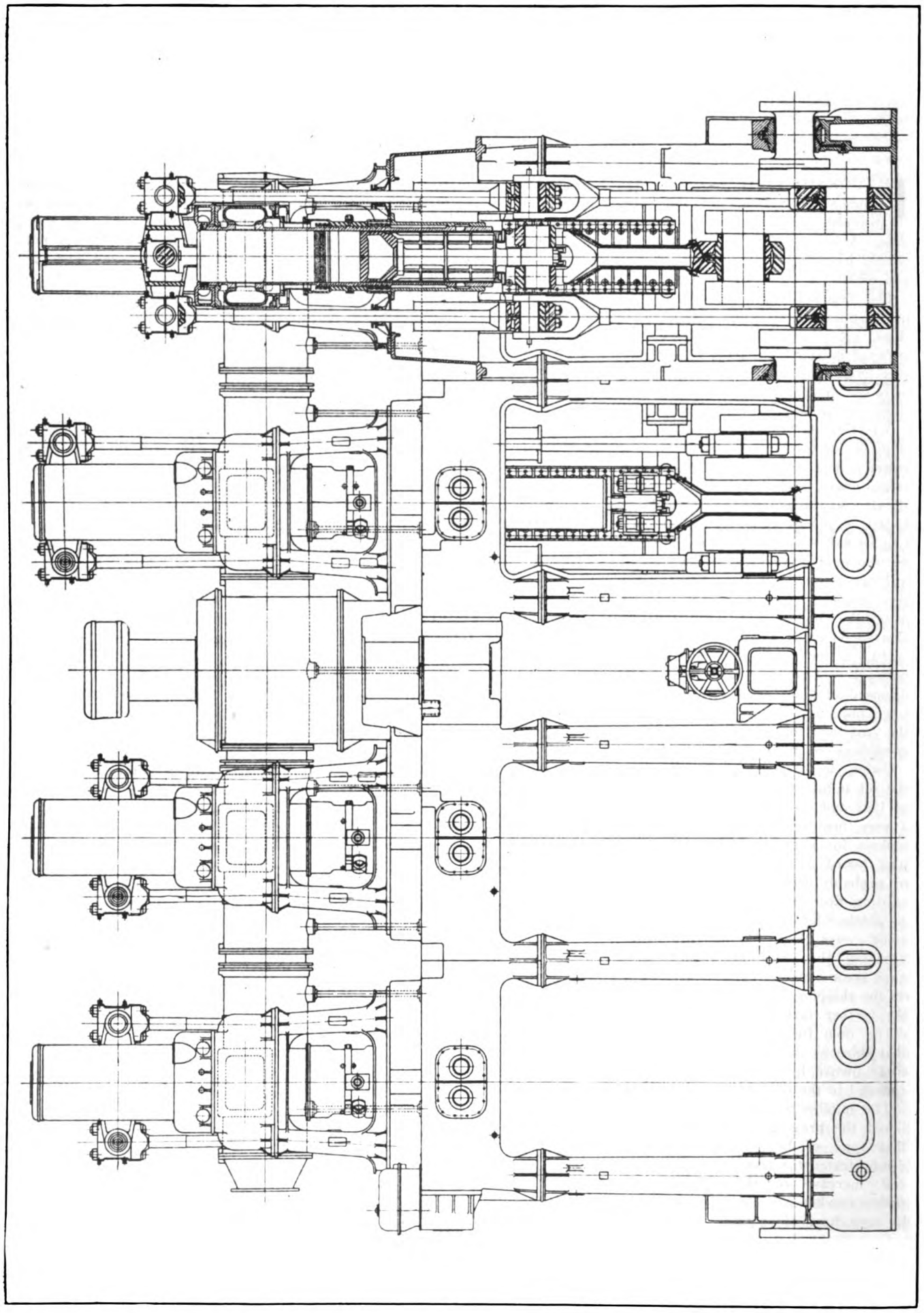
Cargo boats engaged in overseas trade, as a rule, have long trips to make, where the accumulated savings of fuel and reduced fuel weight carried are of great importance, as the purchase of fuel in some foreign ports is a serious expense. One further consideration that must always be recognized in the driving power of a diesel engine is that the power throughout the 24 hours does not fluctuate, as is so usual in steam-driven ships. With reliable running assured (and every day the diesel engine is becoming more so), the shipowner can count with a satisfactory degree of accuracy the actual operating days his vessel is going to require to reach a certain destination.

Our experience has shown us that the ships now owned by the shipping board can, with great advantage, be converted to diesel motor-driven ships, and it will be found later that in the higher powered passenger boats the savings in fuel and space will be still more substantial. The adaptability of the general run of the shipping board ships to diesel motor ships is admitted, and several shipbuilding firms are working on different types at the present time. The Sun-Doxford type for the power developed on a single screw is probably the shortest engine being built in this country at the present time, and, as has been shown, it can be placed in the same space as formerly occupied by a turbine job of similar power.

The Sun Shipbuilding & Dry Dock Co. in the early part of the present year, in the adjustment of its business with the shipping board, purchased from the shipping board two oil tankers with Scotch boilers and geared turbines, 10,200 tons deadweight, and one general cargo boat, 11,800 tons deadweight with Scotch boilers and geared turbines, with the intention of converting these vessels from steam drive to diesel motor drive, by removing the existing steam machinery and installing a Sun-Doxford 2-cycle opposed piston oil engine of 3000 shaft horsepower each. The tankers, which have been dealt with first, were received at the Sun company's yard at Chester, Pa., as follows: The MILLER COUNTY, March 30, 1923, and the BIDWELL, April 19, 1923.

The vessels were placed in drydock for examination of conditions and with a view to consider what, if any, struc-

Paper presented at the thirty-first general meeting of the Society of Naval Architects and Marine Engineers, New York, Nov. 7-8, 1923. The author, Robert Haig, is vice president of the Sun Shipbuilding & Drydock Co.



ELEVATION OF OPPOSED PISTON MARINE OIL ENGINE, SOLID INJECTION TYPE, INSTALLED ON CONVERTED TANKERS

tural alterations on the after part of the vessels would be required. The vessels were later taken off the dock and put in the wet dock, and the work of dismantling the machinery proceeded with. The main engines and the center and starboard main boilers of the two tankers were removed, and such steam auxiliaries as were unsuitable for the new power were also removed. The existing auxiliaries that were retained were relocated, and new foundations built and such other auxiliaries as were required were provided, the main engine foundations were built and a new main motor of the 4-cylinder type, 3000 shaft horsepower installed, with the new auxiliaries arranged and properly located. The port boiler at the forward end of the machinery space is retained in its original position as when the vessel was a steamer; the only work done was to case the boiler in, except at the fore end where the entrance is into the fire room. This arrangement lends itself readily to a good installation, causing the minimum of structural alterations. The whole of the machinery was installed with good, generous room for accessibility within the confines of the original bulkheads when the vessel was taken over. A new stern tube and shaft was fitted for the increased power put into the vessel over and above that previously developed with the turbines. The work proceeded satisfactorily. The whole ship was overhauled and reconditioned in all tanks, quarters, etc., the vessel being docked the second time and put in good condition and painted, and after the work had been completed, dock trials were made while the vessel was lying at the yard. The engines worked well, without the slightest vibration. I may state that we were without data as to whether these hulls would set up vibration with this machinery being so far aft, but we were agreeably surprised to find that the working of the machinery developed a steadiness beyond that obtainable, even with our quadruple engines.

The BIDWELL also had motors of the same size and type installed as on the MILLER COUNTY, and after the necessary dock trials and river trial this vessel was sent on a trip to California. Neither of the motors in these two vessels had any shop trials on a test bed, yet they worked at the first trial and each succeeding trial without any failure whatever.

There is nothing mysterious in the construction of diesel motors that need deter shipowners from adopting this type of power; the foremost marine motors on the market today are the product of good design and workmanship based on sound engineering principles. We are all familiar with the various developments from the low-pressure compound up to the present-day geared turbine, causing revolutionary changes, and at each step an improved economy was sought after; sometimes the gain was small, not exceeding 5 per cent. It is not overstating the case when we assert that the gain from the compound engine up to the geared turbine of today has not exceeded 20 to 25 per cent, taking all sizes of steam power on an average basis, yet the gain at each step was sufficiently encouraging to go forward. The shipowner was keenly alive to the value of the lowered fuel cost per horsepower and willing to invest his money in ships that would reduce his fuel bill and machinery weights.

If such economies were considered sufficiently advantageous to warrant investing in a new type of power, how much more attractive from an earning standpoint should the diesel motor be considered when we can offer the owner a saving in fuel alone of 55 to 65 per cent. Further, when we consider the many advantages a lower fuel consumption means, it can be appreciated that it is not only lessened cost for fuel consumed that improves earnings, but less fuel consumed means, less fuel accommodation in the shape of bunkers required, less fuel carried means an increased capacity for more cargo carried and a greatly increased steaming radius of the vessel. Or take the economy resulting from the reduced quantity of fuel required; the diesel tanker could take on 644 tons of fuel at San Pedro where fuel is cheapest and have enough for the round voyage and still allow the vessel to carry to her full normal capacity, whereas if the steamer desired to take advantage of the low cost of fuel and fill up her bunkers for the round voyage, it would mean shutting out about 800 tons of cargo, or go into some port during the trip for fuel at an increased cost, and, of course, bringing on a costly delay.

Take the case of a tanker 12,500 deadweight tons, 3200 indicated horsepower, single screw, leaving California for the East, burning 33 tons of oil fuel per day, which on a 20-day steaming trip is equal to.....660 tons
Additional for 3 days' spare fuel 99 "
Stand by losses raising steam.. 20 "

Total.....779 tons

A diesel tanker of the same size and power with steam auxiliaries would use 15 tons per day, giving 20 days at 15 tons .....300 tons
Additional for 3 days' spare fuel 45 "
Stand by losses ..... nil

Total.....345 tons

The difference is 434 tons or, roughly, a saving for the round trip of about 900 tons with a diesel motor tanker with steam auxiliaries.

Taking the same vessel but fitted with electric auxiliaries, the consumption would be as follows:
20 days at 10.5 tons per day..210 tons
3 days' spare fuel..... 31.5 "

Total.....241.5 tons

Or a saving over the steamer for one trip of 537.5 tons, and for the round voyage 1,075 tons.

The following known weights are set down for comparison only, but are fairly accurate:

Estimated Weights of Propelling Machinery

	Weight of machinery, long tons	Fuel oil required for 25-day trip, long tons	Total long tons
S. S. Bidwell, 10,200 D. W. T., 3 Scotch boilers, 2700 S. H. P., turbines, gears and steam auxiliaries, including water in boiler	580	800—boiler	1380
Duplicate of S. S. Bidwell, 3 Scotch boilers, 3000 I. H. P., triple expansion engine and steam auxiliaries, including water in boiler	670	875—boiler	1545
S. S. Bidwell, 1 Scotch boiler, 3000 I. H. P., Sun-Doxford Diesel engine and steam aux., including water in boiler	758	375—eng. and boiler	1133
S. S. Penna. Sun, 13,000 D. W. T., 4 Scotch boilers, 4500 I. H. P., quad. exp. and steam aux., including water in boiler	1000	1200—boilers	2200
Duplicate of Penna. Sun, 1 Scotch boiler, 4500 I. H. P., Sun-Doxford Diesel eng. and steam including water in boiler	1007	725—eng. and boiler	1732
Duplicate of Penna. Sun, 1 small vertical boiler, 4500 I. H. P., Sun-Doxford Diesel engine, Diesel and elec. aux	980	530—boiler	1510

The weights here set down for tankers with steam auxiliaries and steam heating and cargo pumping outfit indicate the minimum of structural changes due to the conversion to diesel motor drive which are probably the least favorable conditions, yet they show remarkable savings over the steamer, but it will be noted when we consider the straight diesel motor drive with electric auxiliaries throughout deck and engine-room that we get economies in weight and fuel required that amply repay the extra investment.

It is an undoubted fact that at the present time steamship freight rates dominate the freight market, and when

the freight rate drops too low for steamships to make earnings, then the ships must either be laid up as being unprofitable to operate or run at a loss; but one authority has pointed out that in a very few years motorships will dominate the freight rates and by their reduced cost of operation will be able, as they are at the present day, to operate and make profitable returns, while steamships will either be run at a loss or be laid up as being unable to operate profitably, so that shipowners have to consider whether they intend to remain in business and operate ships at a profit(and that is the only known way they can remain for any length of time in business), or take up the question of equipping the vessels with diesel motors and thereby reduce the cost of operation.

Answers Opposing Arguments

One further advantage the shipowners should bear in mind in considering the question of converting steamships to motorships is the increased value of the shipping property fitted with the diesel motor. We are forced to agree that as the number of motor vessels increases the value of the steamer will rapidly decrease.

There are several points that are frequently raised against the adoption of the diesel motor, and it is well that we should discuss them here. One point is that we in this country have had little or no experience in building diesel motors, and that it would be safe to wait until a wider knowledge has been assured; also that the economies claimed for the diesel motor are probably overstated and will be found to be disappointing in results; and finally, if we do eventually manage to produce satisfactory motors, and the economy of operation is equally so, we have not the men to put aboard the ships to successfully operate them.

Precisely the same statements were made when America started to build high-class automobiles—to some minds it was fantastic; results today require no elaboration.

Holding strictly to our marine engineering development, we will recall that at every step in the progress of engineering there have been the same identical doubts and fears; when we went from compound to triple, and later to quadruple expansion engines, with the much increased pressures and temperatures, we were warned of the dangers that would develop. Some few of them did develop both in engines and boilers, but they were gradually improved upon; greater attention to metals and changes in conditions under higher temperature of copper, cast iron, etc., were investigated, and in time the triple and quadruple engines were established with their greater flexibility, higher mechanical efficiency and much reduced fuel consumption. These changes became revolutionary; compound engines were obsolete. A parallel case can be established when the direct turbine and later the geared turbine came into use. The turbine, notwithstanding its multiplicity of parts and fine adjustment required, was in a very short time enormously developed, because it was found eminently suitable for a wide range of powers, giving also lessened weight and lowered fuel consumption per horsepower.

While it is an admitted fact that nearly all of the mechanical development here enumerated had its inception abroad, that has not hindered the construction and development in this country in the remotest degree. In each and every grade and type of power the builders in this country have pushed ahead with an energy and success that have established a high quality of both mechanical accuracy and design. If this has already been done in the developments cited, why should there be any doubt of the capacity of the builders to successfully design and construct the diesel engine?

Probably all of the diesel engines now being built in this country at the present time are being built under foreign patents and very closely following the patentee's design, which is the only wise thing to do, as thereby the builder and owner in this country get the full benefit of the data and experience already gained elsewhere.

The Sun Shipbuilding & Dry Dock Co. is building the Sun-Doxford opposed piston 2-cycle diesel oil engine closely to the plans and data as furnished by Wm. Doxford & Sons, Ltd., Sunderland, England, out of their long extended experiments and research.

Description of Engines

The motors built and installed by the Sun Shipbuilding & Dry Dock Co., on the MILLER COUNTY and BIDWELL are the usual Sun-Doxford 2-cycle opposed piston type, 4 cylinders, 22¾-inch diameter, stroke of each piston 45½ inches, 3060 shaft horsepower at 90 revolutions per minute. Weight of machinery, including fuel pump, flywheel, thrust shaft and Kingsbury thrust is 370 tons. The main motors for the CHALLENGER are of the same size and type. This vessel, however, will be fitted with diesel electric auxiliaries.

Dealing with the last of the charges or objections urged against the diesel motor—namely, the difficulty of getting capable engineer crews who could efficiently and with the necessary patience and care continue to operate diesel motors with the same degree of success as they now operate steam engines—may I state just quite briefly our experience. As we are builders, not operators, we decided to operate the tankers MILLER COUNTY and BIDWELL through the ship-operating department of the Sun Oil Co.

Experience With Engineers

The Sun Oil Co., appointed the engineer for these vessels in the usual way, but at our request the chief engineer and some of his assistants came to our yard about two months before the vessels were completed, so that they should get thoroughly familiar with the job. The MILLER COUNTY arrived at our yard March 30, 1923, and left completed June 26, 1923, or rather less than three months' time was consumed in removing the old machinery, docking the vessel twice, fitting new stern tube and completing the whole installation, including the necessary trial trips. When the vessel left our yard and entered on charter we placed two extra chief engineers on board, also two experienced mechanics. As this was our first ship with this type of power and we wanted to take considerable data, we considered it good judgment to send the extra men. One of the extra chiefs had been observation engineer on one of the Doxford motor ships for six months; the other chief had been responsible for the installation of the machinery. Both chiefs were formerly our guarantee steam engineers. The vessel had then an engine room crew as follows for each watch for the first voyage: One chief engineer, one assistant engineer, one oiler, one fireman, making four men on each watch, with two wipers, also two mechanics on days.

The vessel proceeded to Port Arthur, Tex, and back, making a voyage of 17 days. At the end of the first voyage, one of the extra chiefs was removed, and on the completion of the second voyage the other chief and extra men were removed, since which time the vessel has continued to operate with the same crew as is required for a similar size and type of steam tanker, with the greatest success.

In all, up to date, the MILLER COUNTY has made about five to six trips, equal to about 21,000 miles, with most satisfactory results. The engineers like the ships; there is much less work to do on watch and in port, and it appears to be quite established that when once the men get over the first feeling of strangeness they handle the motors with celerity and confidence.

Contract for handling the radio service on the 535-foot transpacific liners operated from Seattle and San Francisco has been awarded to the Radio Corp. of America.

Nation Aroused by Marine Week

First Marine Congress Wins Country Wide Attention

New York Gathering Brings Together Business and Political Chiefs — Architects Meet — Exhibition Shows Progress

IN A RESUME of the activities of Marine Week, Nov. 5-10, in New York City, three major features stand out, the exposition, the marine congress and the meeting of the Society of Naval Architects and Marine Engineers. During the week, an exhibit was held at the Grand Central Palace, vividly and clearly showing the many developments in marine equipment. Judging from the interest shown and the nature of the exhibits, development in the marine line has not suffered any check during the past slump in shipping. The indications are that manufacturers dealing with the marine field have a decidedly greater optimism in regard to the future than ever before. Much interest is shown in the tendency to study economies of operation and particularly the possibilities of the diesel engine for motive power in order to reduce fuel costs. During the week, the American Marine congress convened at the Waldorf-Astoria. Col. E. A. Simmons acting in place of the secretary of commerce, Herbert Hoover, opened the congress. President Coolidge indicated his interest in the congress in a cordial letter. The various committees which had been working for some time on recommendations for an improvement in the merchant marine, had done their work so thoroughly, that it was possible actually to formulate and pass a number of resolutions on the best methods to pursue, based on the consensus of opinion of many widely diversified interests of the marine field and of industry in any way connected with shipping. These resolutions may be found complete, following this article.

The activities of the marine congress during this week show that co-operative action can be taken with excellent advantage on the part of all the varied interests that feel the great importance of an adequate merchant marine for the country. The decision was reached to form a permanent organization composed as the American marine congress was of representatives from every phase of the industry and of other interests which need the services of the merchant marine. In his speech in the American marine congress banquet at the Waldorf-Astoria on Nov. 8, Secretary Hoover particularly touched upon an important factor in the development of the country's commerce in stressing the fact of double taxation for American business representatives in foreign countries, which places them at a disadvantage in relation with the representatives of other nations. This condition of affairs has seriously affected the growth of American representation abroad. American manufacturers are forced to do a great deal of their trading through foreign representatives. The following quotation from Secre-

FRANK J. SHIPMAN
Unanimously Elected President of the American Marine Association, in Recognition of His Success in Making the First Marine Week an Event of National Importance. He is Superintendent of Government and Marine Sales for the Texas Co., New York.

Some of the Marine Leaders Who Made

William Stayton
EXECUTIVE COMMITTEE
American Marine Association, President, Baltimore Steamship Co., Baltimore

E. A. Simmons
CHAIRMAN
Central Committee, President, American Marine Association, New York

H. F. Alexander
EXECUTIVE COMMITTEE
American Marine Association, President, Admiral Lines,. Seattle

H. H. Raymond
CHAIRMAN
Coastwise Shipping Committee, President, of the Clyde Steamship Co., New York

W. P. Smith
CHAIRMAN
Delaware River District Committee, Manager of Sales, Wm. Cramp Shipyard, Philadelphia

R. H. M. Robinson
CHAIRMAN
Steamship Owners and Operators Committee, President, United American Lines, New York

Admiral C. W. Dyson
REPRESENTATIVE
American Society of Naval Engineers, Washington

Fred B. Dalzell Jr.
REPRESENTATIVE
New York Towboat Exchange, New York

I. C. C. Cooper
REPRESENTATIVE
American Association of Engineers, New York

the First Marine Congress a Success

R. V. Sawhill
EXECUTIVE COMMITTEE
American Marine Association, Editor, Marine Review, Cleveland

Charles H. Potter
CENTRAL COMMITTEE
President, United States Ship Operators' Association, New York

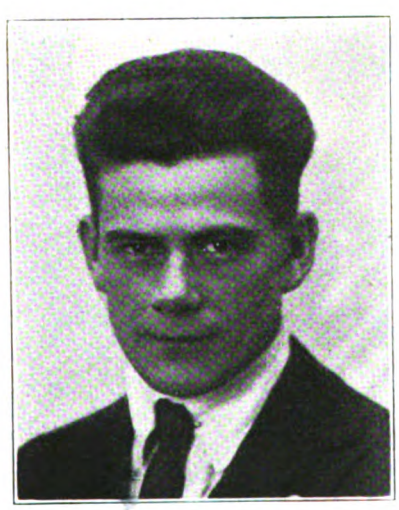
H. A. Magoun
CENTRAL COMMITTEE
President, Atlantic Coast Shipbuilders' Association, Philadelphia

A. A. Schantz
CHAIRMAN
Great Lakes Shipping Committee, President, Detroit & Cleveland Navigation Co., Detroit

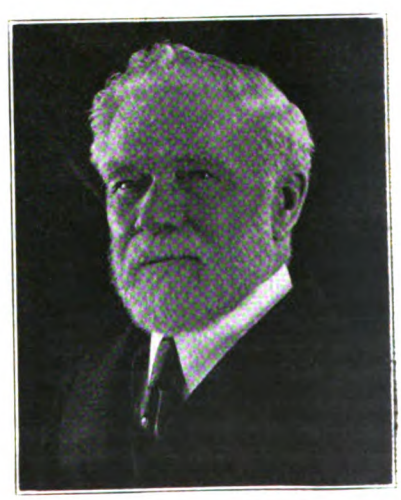
F. C. Bradbury
CHAIRMAN
Great Lakes District Committee, Manager of Marine Department, Crane Co., Chicago

K. Warren Heinrich
SECRETARY,
American Marine Association, Vice President, Davis Engineering Corp., New York

A. M. Knowles
REPRESENTATIVE
American Association of Engineers, New York



Capt. J. F. Milliken
REPRESENTATIVE
Of the Neptune Association, New York Member, New Organization Committee



William Livingstone
REPRESENTATIVE
Lake Carriers' Association, Detroit, of Which He is President

Architects Elect New Officers

VICE PRESIDENT

For term expiring Oct. 31, 1926.

Homer L. Ferguson,
Henry A. Magoun,
Frank L. DuBosque,
William A. Dobson.

COUNCIL MEMBERS

Representing Members. For term expiring Oct. 31, 1926.

Herbert C. Sadler,
Daniel H. Cox,
Charles F. Bailey,
William H. Todd,
Ernest H. Rigg,
William McEntee.

COUNCIL MEMBERS

Representing Associates for term expiring Oct. 31, 1926

Herbert L. Aldrich,
Winthrop L. Marvin,
Morris Douw Ferris.

EXECUTIVE COMMITTEE

Stevenson Taylor,
Washington L. Capps,
Andrew Fletcher,
Frank L. DuBosque,
Joseph W. Powell,
Homer L. Ferguson,
Alfred Gilbert Smith.

COMMITTEE ON PAPERS

Frank L. DuBosque,
J. Howland Gardner,
Herbert L. Aldrich.

SECRETARY-TREASURER

Daniel H. Cox.

ASSISTANT SECRETARY-TREASURER

Thomas J. Kain.

tary Hoover's speech clearly indicates the earnestness of the present government in Washington in its desire for a correct solution of the problems confronting shipping. He said:

"In a broad sense the American people are endeavoring to establish a merchant marine that will adequately protect and promote our commerce. The ideal is regular, ferry-like service of boats of the cargo liner type with some passenger capacity traversing the great trade routes of the world and carrying at least 50 per cent of our foreign trade. Today, outside of oil, we are carrying less than 20 per cent. Some day we will attain such a merchant marine. Our national necessities, the capacity of our people for organization, for mechanical development and enterprise will some day bring it about.

"It is simply a truism to say that we must have an American merchant overseas marine. Entirely apart from the fine sentiment and national pride

EDWARD A. COLSON

New Vice President of the American Marine Association, a Promotion Won Through His Hard Work in Making a Success of the First Marine Week. He is Chief Operating Engineer, Marine Department, Babcock & Wilcox Co., New York.

of a great trading nation in keeping its flag upon the seas, we must have our own ships for the protection of our foreign trade; we must have ships if we would expand our exports on sound lines and we must have them as an auxiliary to our national defense."

The banquet of the American marine congress had a full and enthusiastic attendance. Besides Secretary Hoover, Rear-Admiral C. P. Plunkett, commandant of the Brooklyn navy yard,

DANIEL H. COX

Re-elected Secretary of the Society of Naval Architects and Marine Engineers.

New Officers Chosen by American Marine Association

PRESIDENT

Frank J. Shipman,

Superintendent of Government and Marine Sales, Texas Co., New York.

VICE PRESIDENT

Edward A. Colson,

Chief Operating Engineer, Marine Department, Babcock & Wilcox Co., New York

MEMBERS OF EXECUTIVE COMMITTEE

H. F. Alexander,

President, Pacific Steamship Co., Seattle.

A. E. Allen,

Manager, Westinghouse Electric & Mfg. Co., New York.

S. I. Cooper,

Assistant Manager, Southern Pacific Co., New York.

W. M. McFarland,

Manager Marine Department, Babcock & Wilcox Co., New York.

James S. Milne,

Vice President, Todd Shipbuilding Corp., New York.

R. V. Sawhill,

Editor, MARINE REVIEW, Cleveland.

Col. E. A. Simmons,

President, *Marine Engineering and Shipping Age*, New York.

Capt. Wm. H. Stayton,

Baltimore Steamship Co., Baltimore.

Winthrop L. Marvin, vice president of the American Steamship Owners association, and O. E. Bradfute, president of the American Farm Bureau federation, spoke at length on the different phases of the merchant marine question.

Meeting of the Society of Naval Architects and Marine Engineers

The meeting of the Society of Naval Architects and Marine Engineers, the thirty-first general meeting, was held at the Engineering Societies building, 29 West Thirty-ninth street, and was well attended. President W. M. McFarland, presided. The condition of the society is excellent, though the membership has fallen off after the peak during the war. The endowment fund of the society is growing satisfactorily. In his address, the president touched upon the seriousness to the profession of the lack of activities which would employ the services of many highly trained and experienced men. He also touched upon the activities of the American marine congress and of the beneficial results which may be expected from its activities. The growing importance of coastwise services and of the transportation on the bays, lakes and rivers of the coun-

(*Continued on Page* 478)

Convert Idle Vessels to Diesel

Economy of Operation Will Widen Field of American Competition — Urges Federal Fund to Promote Conversion

BY REAR ADMIRAL WILLIAM S. BENSON

AS A result of hasty construction to meet the emergency of war, a number of government built vessels were unavoidably equipped with machinery of untried design.

As matters now stand, there are yet under control of the shipping board 262 vessels equipped with geared turbines and watertube boilers, 14 with turbines and Scotch boilers and 85 with reciprocating engines and watertube boilers, or a total of 361 vessels variously affected by deficient machinery, the majority of which have been in lay-up for some time.

The hulls, however, are of good competitive design, generally well built and have been fairly well preserved, so that they are most logically suited for diesel propulsion, and if this conversion can be effected at a reasonable cost, they should prove competitive and valuable additions to the American merchant marine.

Realizing their potential value, and in order to offset the present high costs of conversion, the board has, for some time, been offering these vessels for sale at a nominal price on the well known diesel conversion plan, but while a few have been so disposed, the response from shipowners has been somewhat disappointing. However, this may be due to the stagnation of international commerce, the high cost of diesel machinery and attendant auxiliaries and to the difficulty of financing new marine ventures under the present unsettled conditions.

Much has been written on the relative advantages of steamers and motorships, but little or no information of actual performance has been published. Therefore, comparative data on two sister ships owned by the board should be of particular interest.

The vessels in question are the twin screw motorship WILLIAM PENN, equipped with twin Burmeister and Wain 6-cylinder diesel motors of 4200 total indicated horsepower normally operating at 105 revolutions and fitted with electrical auxiliaries throughout and the ETHAN ALLEN, equipppd with a single quadruple expansion engine of 3200 indicated horsepower normally operating at 75 revolutions, three Scotch boilers and excellent steam auxiliaries throughout. The two installations can be considered of equivalent high grade; both vessels are of post war construction by the same yard, have substantially the same lines and the following general dimensions:

Length between perpendiculars, 439 feet 6 inches; beam molded, 60 feet; depth, molded, 36 feet 8 inches; summer load draft, 28 feet 4 inches.

Both vessels are being operated over long transpacific routes but by different companies; the WILLIAM PENN, since September, 1921, has completed three around the world voyages totaling nearly 84,000 miles and is now on her fourth voyage. The ETHAN ALLEN has also been in commission for some time but accurate information as to her performance is available only for her last voyage. The performance records are shown in the following table:

	Ethan Allen	William Penn			Totals or Averages
Voyage number	54	1	2	3	
Number of ports called	21	18	15	18	51
Days at sea between pilot stations	88.7	109	104	96	309
Total distance steamed	22,951	27,769	26,977	28,317	83,063
Average speed between pilot stations	10.78	10.65	10.83	11.29	11.06
Total fuel at sea	3,220	1,419	1,394	1,395	4,208
Total fuel in port	1,059	93	106	73	272
Total fuel sea and port	4,279	1,512	1,500	1,468	4,480
Miles per ton of fuel	7.12	19.6	19.3	20.29	19.71
Average daily fuel at sea	37.47	13.04	13.04	14.53	13.29
Average daily fuel in port	22.79	0.75	1.08	0.64	0.82
Average daily fresh water	9.9	2.4	3	2.16	.....
Total cost voyage repairs engine-room	3,501	None	None	112	112
Total cost voyage repairs deck machinery	None	393	None	None	393

The tabular comparison shows that on a ton of fuel the WILLIAM PENN can cover a distance two and three quarter times greater than the ETHAN ALLEN. Unfortunately the steamer's port consumption is vitiated by the necessity of maintaining steam up while in Oriental ports, for emergency purchases which is not required by the motorship, and a direct normal comparison, therefore, is not possible. It may be stated, however, that fuel port consumption of the average steamer is from 10 to 12 times greater than a motorship.

It must be admitted that the above comparison leaves no doubt as to the substantial savings in fuel, water, engine room wages and subsistence realized by the motorship not to speak of other indirect advantages such as increased cargo capacity and greater flexibility of operation with consequent smaller operating expenses. As the sale of good hulls at a nominal price, makes possible their conversion at a cost but little higher than newly built foreign steam tonnage and much less than foreign built motorships, it follows that by the possession of high grade vessels of low initial cost the American shipowner is at once placed in the privileged position heretofore enjoyed by his foreign competitors.

In my estimation, the retention of the advantages already gained in overseas commerce and their further development for the benefit of American industries, largely depends on the extent and rapidity of adoption of the internal combustion engine for marine propulsion. Therefore, I shall urge the following constructive measures:

1.—The extension of the benefits of Section No. 11 of the merchant marine act of 1920 to the conversion of American flag steamers of the best and most efficient type, into reliable and economical motorships.

Should congress approve such modification, the board can then loan two-thirds of the conversion cost at a reasonable rate of interest, with payments extending over a period of years, thereby greatly facilitating the financing of conversion projects.

2.—The adoption of a suitable policy of standardization for the ultimate object of reducing production costs of diesel machinery and auxiliaries. Considerable study has already been given to this subject and further progress is anticipated with the co-operation of the builders.

3.—The conversion of a number of the board's own steamers to serve the long distance routes, for the two-fold purpose of reducing cost of operation and give impetus to domestic diesel construction.

Once the builders' expenditure for initial developments are partially absorbed, private shipowners will benefit by subsequent lower costs and the

An address before the Propeller club, New York, Oct. 25. The author is a member of the shipping board.

sale of shipping board hulls will be stimulated.

The above measures are urged to all men of vision who believe in an adequate and self-supporting American merchant marine befitting our traditions, our present national needs and our just aspiration to an equitable share of the world's commerce.

Improved Design Will Save Money

BY W. W. SMITH

Chief Engineer, Federal Shipbuilding Co.

FOREMOST in our minds today is the question, "how can we make our ships pay?" Many factors compose the answer to this question. One factor of considerable importance is the economics of the design and construction of machinery.

When machinery is designed and built, there go into it economic characteristics and limitations which continue during its life. Thus, the maximum economy is fixed by the design and in general, it can never be exceeded. It is, therefore, most important to give careful attention to the design, so as to obtain the highest possible economy or, in other words, the greatest financial return.

To secure the highest economy in the operation of machinery, constant effort and eternal vigilance are required for the life of the ship—say, for 20 or 25 years. On the other hand, to secure the highest economy of design and construction, only one or two years are required. Thus, it is much easier to secure the highest economy of design. In general, the easiest way to secure a high economy is to design and build it into the machinery.

One would naturally suppose that full advantage would be taken of this in practically every design but, unfortunately, it is not done in too many cases. This results in fixing a low limit to the economy of the machinery, which in consequence, reduces the earning power of the vessel.

I believe it will pay handsomely to give considerably more time and attention to this important feature, than is done in most cases. After machinery has been built, changes can often be made to improve the economy but it is far cheaper and better to incorporate these changes in the original design.

The principal features which influence the economies of machinery may be summarized as follows:

First of all, the machinery should be rugged, reliable and safe. There should be sufficient duplication of important units to provide for emergencies.

The design should be as simple as possible. There should be no unnecessary duplication or complexity. Within reasonable limits, the simplest design is usually the most reliable and efficient.

The weight should be as low as possible, since it affects the first cost and the cargo capacity. However, this should not be accomplished by reducing factors of safety but by skillful engineering. The first cost should be low but not at the expense of quality.

The fuel consumption should be low but not at the price of greater expense in overhead.

The cost of operation, which is fixed by the design, should be low. This includes the cost of the engine room staff and repairs.

To determine the best type of machinery, the various economic factors, including the above, must be accurately evaluated and the net earnings, or the return on the capital invested, determined. The best type, regardless of opinion, is the one which actually shows the highest return on the capital invested. Consequently the selection of the best type and design of machinery is a problem in economics.

Guides to Economy

I have had the opportunity of studying a large number of estimates and comparisons for various types and designs of machinery, from which I have drawn conclusions as to the most suitable types for average vessels. These I will give as a rough guide only.

Up to about 500 horsepower, the oil engine is usually best. The use of oil engines in these powers is growing rapidly, due chiefly to the simplicity of the machinery and to the low cost of operation. For the same reason, the 2-cycle, single-acting, airless-injection engine seems preferable.

From 500 to 1000 horsepower, an oil engine of the right design will have an advantage but it can not be too heavy or expensive. In many cases, the excessive weight and cost of the oil engine gives the advantage to the steam engine.

From 1000 to 2000 horsepower, the steam engine has the advantage over the single-acting oil engine in practically all cases. On the other hand, the 2-cycle, double-acting oil engine would, if available, have the advantage.

From 2000 to 4000 horsepower, the geared turbine with superheated steam is considerably better than the single-acting oil engine. In this case also, a 2-cycle, double-acting oil engine would be advantageous.

From about 4000 horsepower up, the geared turbine with superheated steam and watertube boilers of the right type has the advantage and is likely to keep it for some time.

There is, of course, a wide variation in service conditions, which will materially affect the selection of machinery in specific cases. Also, the lines of demarcation which are given are only rough approximations.

The oil engine is making progress but it has not fully arrived yet. For economic reasons, the 2-cycle, double-acting engine is necessary for the larger powers. When it is available it will have important advantages in many cases.

Now let us take up some of the more important elements of the design which materially affect economy.

The use of superheated steam is advantageous. By using 200 degrees superheat, a saving in fuel of about 12 per cent can be effected, the weight of the installation can be reduced about 8 per cent and the first cost about 6 per cent. The reduction in weight and first cost is due to reducing the size of the boilers, condensers and auxiliaries, which results from the smaller steam consumption. These savings are well worth while.

The use of watertube boilers of the right type for large powers gives an important advantage since there is a considerable saving in weight, space and cost.

The correct design of turbine is most important for high efficiency. There must be enough blading in the turbine to absorb the energy in the steam efficiently, not only at full speed, but also at reduced speeds. Low velocity ratios and high blade speeds give small, cheap turbines, but the steam consumption is high, especially at reduced speeds and they are not reliable. The extra cost for high velocity ratios and low blade speeds is a small part of the total cost and it is fully justified, since the cost of the complete installation and of operation are reduced.

I think marine engineers have now learned to seek the best reduction gear. The load on the teeth should be conservative—about 50 to 60 pounds per

An address before the Propeller club, New York, Oct. 25.

inch of face per inch of diameter. For double reduction gears, it is best to separate the high and low speed gears, using flexible couplings between them.

Judging from a number of accurate estimates and comparisons, I think it is true beyond question that the complexity, weight and cost of the diesel electric exceeds the direct drive.

I wish to point out two cases of bad economics in design which have occurred frequently. The diameter of the propeller has been too small for given revolutions and vice versa. The design of a propeller can not be guessed at or fixed by so-called experience. For given revolutions, there is a definite diameter and pitch for the highest efficiency. Likewise, for a given diameter, there are definite values of revolutions and pitch for the best results. It pays well to use the most efficient propeller for given conditions and to fix conditions that will give a good efficiency.

The boiler evaporation has been much too low in many cases and especially with oil fuel, resulting in a heavy and expensive boiler plant. An evaporation between 5½ and 6 pounds per square foot of heating surface usually gives the best results.

I believe the great development and economic advantages which have been accomplished in other fields through skillful engineering can be paralleled in the marine field. I am convinced that skillful engineering is one of the most important factors in making our ships pay, and that it will go far in putting the American flag on the high seas and keeping it there.

Ocean Freight Rates

Per 100 Pounds Unless Otherwise Stated

Quotations Corrected to Nov. 10, 1923, on Future Loadings

New York to	Grain	Provisions	Cotton (H. D.)	Flour	General cargo cu. ft.	General cargo 100 lbs.	††Finished steel
Liverpool	3s 3d	$0.40	$0.30	$0.19	$0.30	$0.60	$7.00T
London	3s 3d	0.40	0.30	0.19	0.30	0.60	7.00T
Christiania	$0.19	0.40	0.40	0.23	0.42½	0.85	8.00T
Copenhagen	0.19	0.40	0.40	0.23	0.42½	0.85	8.00T
Hamburg	0.12	0.35	0.27½	0.17	0.37½	0.75	8.00T
Bremen	0.12	0.33	0.25	0.17	0.37½	0.75	8.00T
Rotterdam	0.15	0.32½	0.25	0.20	0.35	0.70	7.50T
Antwerp	0.15	0.32½	0.25	0.20	0.35	0.70	7.00T
Havre	0.16	0.40	0.22½	0.25	0.35	0.70	8.00T
Bordeaux	0.16	0.40	0.22½	0.25	0.40	0.75	8.00T
Barcelona	0.25	12.00T	0.40	10.00T	—12.00T—		10.00T
Lisbon	0.20	0.65	0.40	7.00T	—20.00T—		7.00T
Marseilles	0.18	0.55	0.50	5.60T	—20.00T—		5.00T
Genoa	0.17½	0.50	0.35	0.30	0.40	0.80	6.00T
Naples	0.17½	0.50	0.35	0.30	0.40	0.80	6.00T
Constantinople	0.23	15.00T	0.75	0.35	—20.00T—		8.00T
Alexandria	0.25	15.00T	0.75	0.35	—20.00T—		8.00T
Algiers	0.20	0.75	0.75	0.30	—20.00T—		7.00T
Dakar	.....	14.50T	.....	13.00T	—20.00T—		10.00T
Capetown	6.00T	10.00T	12.00T	7.50T	—10.00T—		8.00T
Buenos Aires	.....	18.00 to 20.00T	.....	.....	18.00 to 20.00T†		6.00T†
Rio de Janeiro	.....	19.00 to 21.00T	.....	7.00 to 7.70T	19.00 to 21.00T†		6.00 to 6.60T†
Pernambuco	.....	22.00T	.....	9.00T	—22.00T—†		10.00T†
Havana	0.17½ to 0.22½*	0.37½*	.....	0.17½*	0.47*	0.94*	0.20*
Vera Cruz	0.25	0.30	0.35	0.25	0.52½	1.05	0.30
Valparaiso	.....	1.07	.....	0.70	0.45	0.80	12.00T
San Francisco	.....	0.40 to 0.70	.....	0.70 to 1.00	.....	2.50	0.55 to 1.00
Sydney	.....	18.00T	2.50	18.00T	18.00-24.00		9.00-12.00T
Calcutta	.....	16.00T	0.65	15.00T	—16.00T—		10.00T

T—Ton. †Landed. ††Heavy products limited in length. *Extra charge for wharfage.

From North Pacific Ports to	Lumber Per m. ft.
San Francisco	$6.50 to 7.00
South California	7.00 to 7.50
Hawaiian Islands	10.00 to 10.50
New Zealand	15.00 to 16.00
Sydney	15.00 to 16.00
Melbourne-Adelaide	15.00 to 17.00
Oriental Ports	12.00 to 14.50
Oriental Ports (logs)	19.00 to 21.00
Peru-Chile	13.00 to 15.00
South Africa	19.00 to 20.00
Cuba	11.00 to 14.00
United Kingdom	80s to 90s
United Kingdom (ties)	70s to 80s
Baltimore-Boston range	$11.00 to 13.00
Baltimore-Boston range (ties)	Not quoted
Buenos Aires	14.00
Flour and Wheat	
Oriental Ports (net ton)	$ 6.00 to 6.50
U. K. and Continent (gross ton)	32s 6d to 37s 6d
General Merchandise	
Oriental ports	$10.00
Steel	
Oriental Ports	$5.00T to 7.00T
Cotton	
Oriental Ports	35c to 50c per cwt
Apples	
United Kingdom	90 cents per box
Copper	
Oriental Ports	$5.00
Box Shooks	
Oriental Ports	$10 measurement ton
Metal Junk	
Oriental Ports	$10.00
Scrap Copper	
Oriental Ports	$5.00
Salt Herring	
Oriental Ports	$8 measurement ton
Machinery	
Oriental Ports	$7.00
Automobiles	
Oriental ports	$8.00

Principal Rates To and From United Kingdom

	s	d
Grain, River Plate to United Kingdom	21	6
Coal, South Wales to Near East	10	0
Coal, United Kingdom to Hamburg	5	9
Coal, United Kingdom to Buenos Aires	13	6
Iron ore, Bilbao to Middlesbrough	6	6
General British market, six months time charters, per ton per month	6	0

Bunker Prices

At New York

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel oil alongside per gallon
Oct. 13, 1922	$8.55	$1.45	5.50 cents
Jan. 11, 1923	7.90	1.50	4.75 cents
April 11	6.75@7.50	1.76½	5.10@5.35c
July 11	5.50@7.00	1.76½	4.40@5.50c
Oct. 11	5.25@6.85	1.51½	4.00@4.50c
Nov. 10	5.25@6.50	1.51½	4.00@4.50c

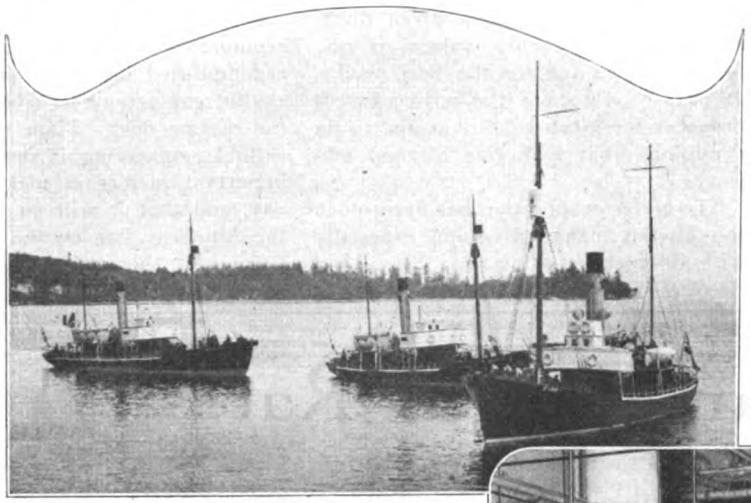
At Philadelphia

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel oil alongside per gallon
Oct. 13, 1922	$8.30	$1.47	5.00 cents
Jan. 9, 1923	7.30@8.00	1.57½	5.00 cents
April 10	6.00@6.50	1.875	5.10 cents
July 9	5.25@6.25	1.62 @1.73	4.35@4.60c
Oct. 11	5.00@5.50	1.36½@1.51	4.12@4.36c
Nov. 10	5.00@5.50	1.36½@1.51	4.00@4.25c

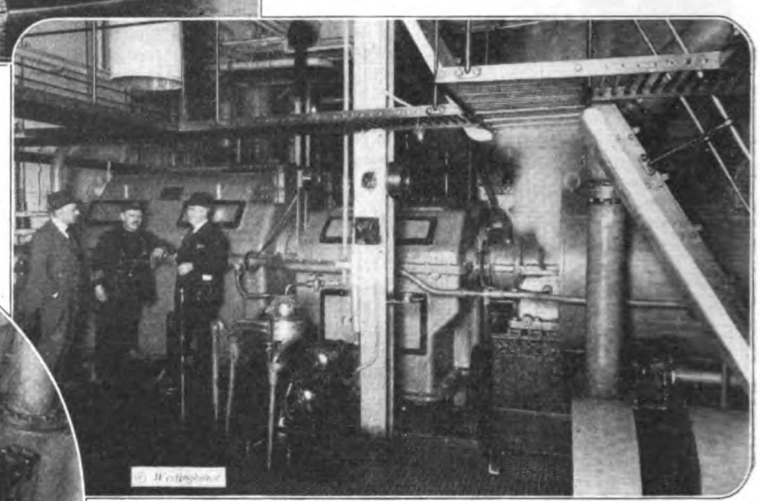
Other Ports

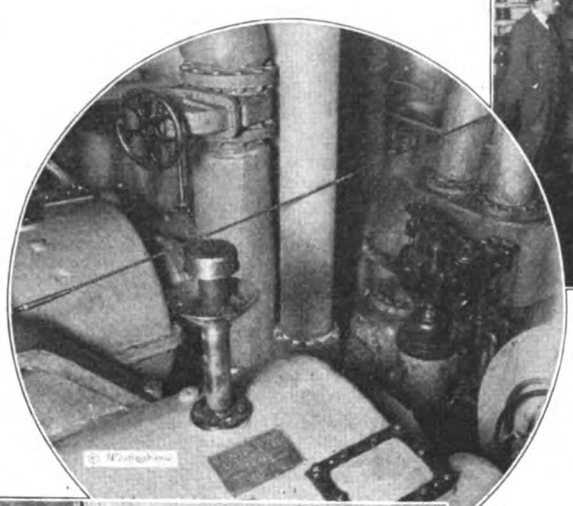
Boston coal, per ton . $7.41
Boston, oil, f. a. s., per barrel $1.45
Hampton Roads, coal, per ton t.i.b. 5.50@5.70
Cardiff, coal, per ton. 18s
London, coal per ton 25s
Antwerp, coal, per ton 25s

Photographs from Far and Near



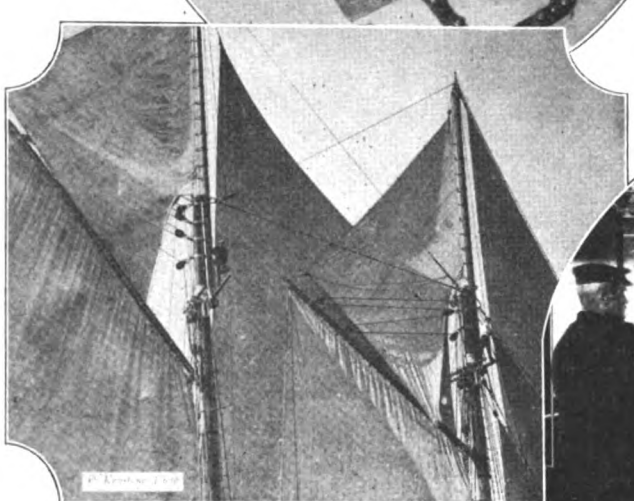
Steel whaling steamers Star I, Star II and Star III leaving Puget Sound for Ross sea in the Antarctic ocean. Built at Seattle for Alaskan whaling service, they have been sold to Norwegians for use on the other side of the world.



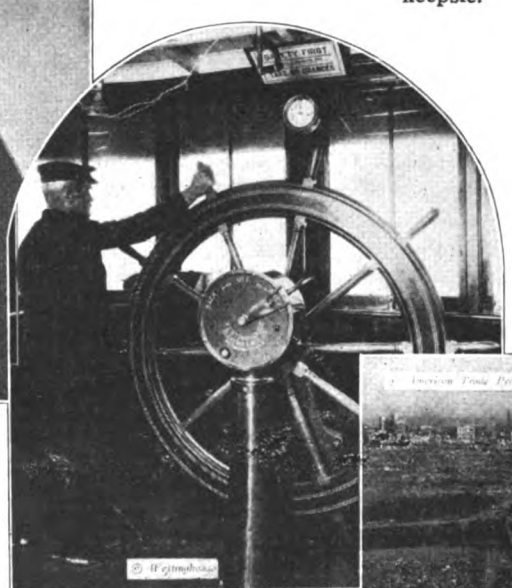


Engine room views on American steamer Mount Carroll, recently changed from a passenger carrier to run in the intercoastal freight service. Above, 4200 horsepower turbine. At side, operating mechanism of oil type governor installed to keep turbines from racing.

At the wheel of the electric driven ferry Poughkeepsie.

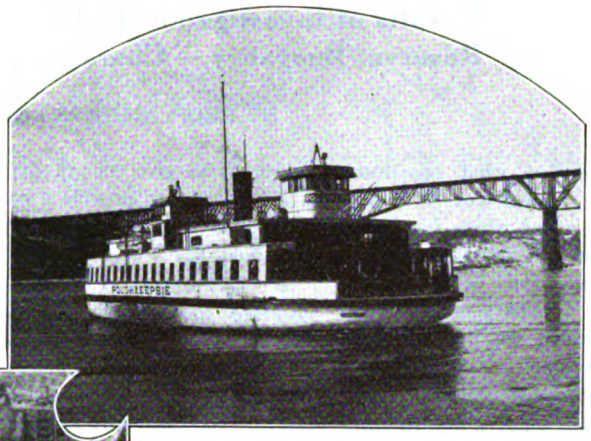


Shaking out the big topsails on the fishing schooner Columbia which represented America in the annual fishermen's race, won for a second time by the Canadian schooner Bluenose.

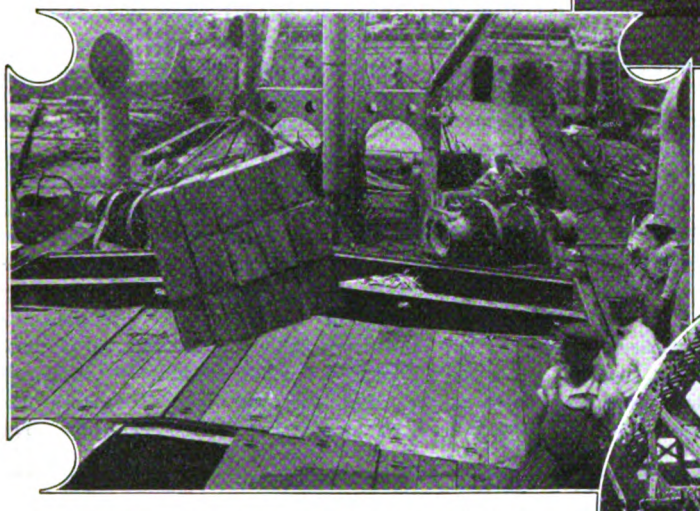


Looking toward harbor at Yokohama with crumbled foreign quarter in foreground.

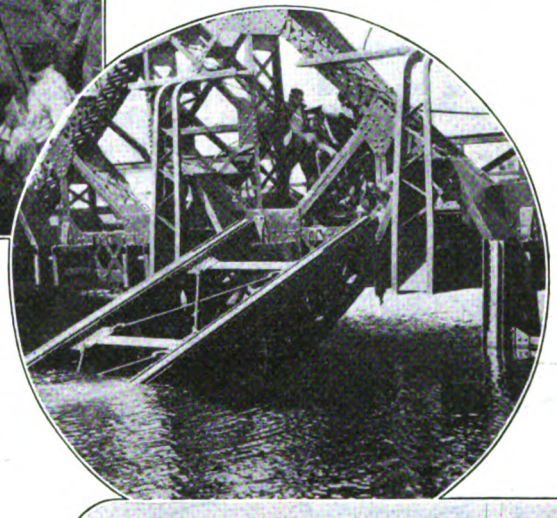
Latest Marine News in Pictures



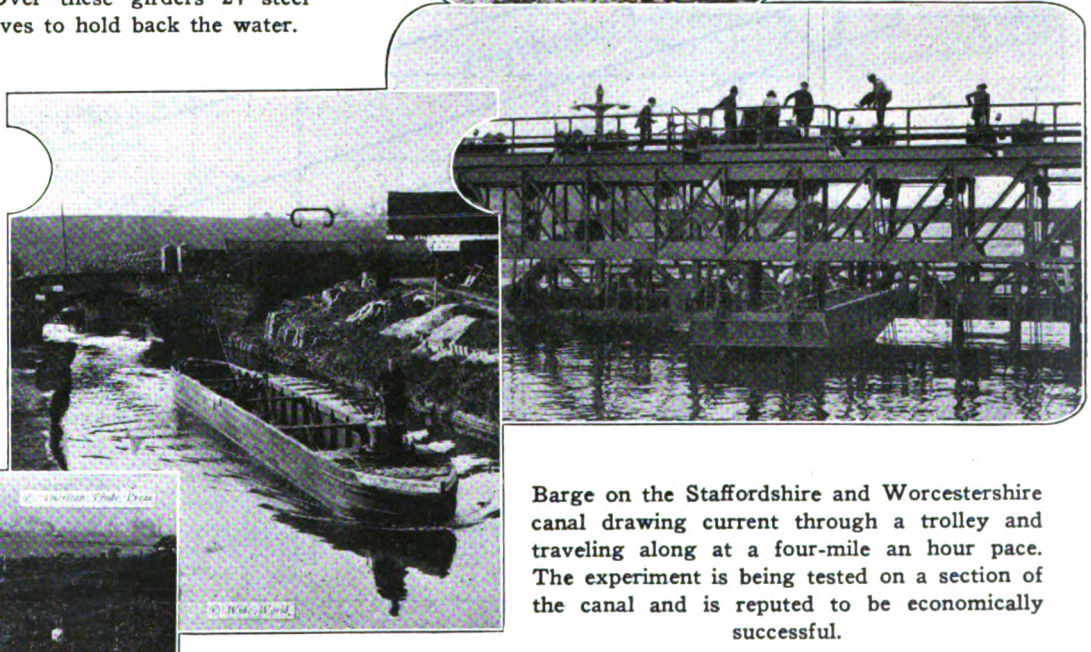
Electric driven ferry Poughkeepsie which has been giving excellent service on her steady passage back and forth across the Hudson river. She was one of the first ferries to be designed for electric drive.



Mechanical methods of handling cargo, both package and bulk, to and from the ship are steadily gaining both in favor and in efficiency. Electric equipment aboard ship is advancing this economical development.



Testing the new emergency steel dam at the Lake Washington locks, Seattle, which hold back the waters of Lake Union and Lake Washington from Puget Sound. The dam consists of only 32 parts. Below at right, operating bridge and underneath wicket girder bridge. At the right, this 16-ton wicket girder fits into cement girder at the bottom of the canal. Over these girders 24 steel gates fit in grooves to hold back the water.



American relief ships, both from naval and merchant service, in harbor of Yokohama..

Barge on the Staffordshire and Worcestershire canal drawing current through a trolley and traveling along at a four-mile an hour pace. The experiment is being tested on a section of the canal and is reputed to be economically successful.

Safety Factors in Lake Ships-III

Results of Investigation To Determine Freeboard and Reserve Buoyancy — Characteristics of Lake Waves

BY PROF. ANDERS LINDBLAD

THE question of what constitutes the proper amount of freeboard for vessels is one which is of very great importance in considering the safety of ships. The governments of most countries have found it necessary to issue rules and regulations which fix the freeboard and thus the maximum draft to which the vessels are permitted to load.

Even though these rules differ to some extent in the various countries the underlying ideas and principles, which have had an influence in the framing of these rules, are fundamentally the same*.

The object of the freeboard is:

A To provide a sufficient *reserve of buoyancy* to give enough lifting power in a seaway and to provide a margin against a possible leakage and entry of water in the hold.

B To provide a suitable *height of working platform* so that the waves will not throw any large amount of water aboard which may endanger the crew in moving about the deck and also do damage to hatches, fittings and superstructures. It is clear the problem of fixing a proper freeboard can not be solved in an entirely theoretical and mathematical way; and it can not, for example, be claimed that the assignment of one inch more or less of freeboard makes the difference between a safe and an unsafe vessel.

A comparison of the freeboard rules in force shows that apparently the authorities of the different countries have arrived at nearly the same conclusions as to the required amount of the freeboard. The British board of trade requires for flush deck vessels of 400 to 600 feet length nearly the same per cent of reserve buoyancy as the German rules prior to 1909. For vessels 450 to 600 feet long, there is a difference in this respect of only about 1 per cent.

Figs. 10 and 11 show how some lake freighters compare with these requirements. Fig. 10 gives the percentage of reserve buoyancy and shows clearly that this percentage increases rapidly with the length of the vessels.

Fig. 11 gives the reserve buoyancy at the drafts proposed for the Great Lakes vessels in a tentative table of freeboard issued by the freeboard committee. These drafts are indicated by the vertical lines drawn in the diagrams. In the above mentioned table, the increase in freeboard during the winter months is considerably greater for the lake freighters than that adopted for ocean going ships. Dur-

*See the following papers: "Notes on the Freeboard Rules" by J. Foster King Trans. I. N. A. 1906; "The Load Lines of Merchant Ships" by Sir Phillip Watts, Trans. I. N. A. 1916, "Rules and regulations for Freeboard" by David Arnott, Trans. S. N. A. & M. E. 1920.

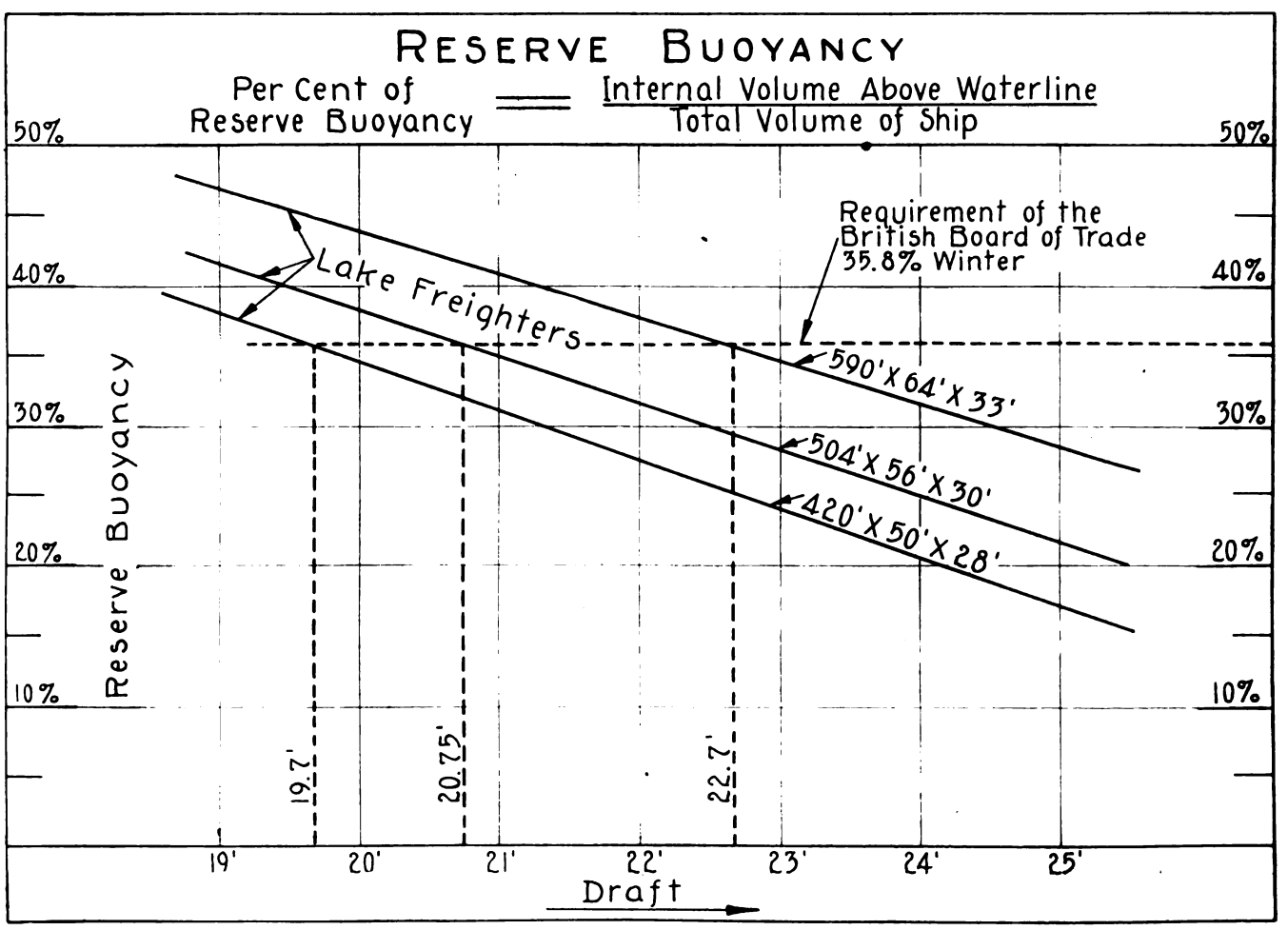


FIG. 10—PERCENTAGE OF RESERVE BUOYANCY OF LAKE VESSELS INCREASES RAPIDLY WITH THE LENGTH

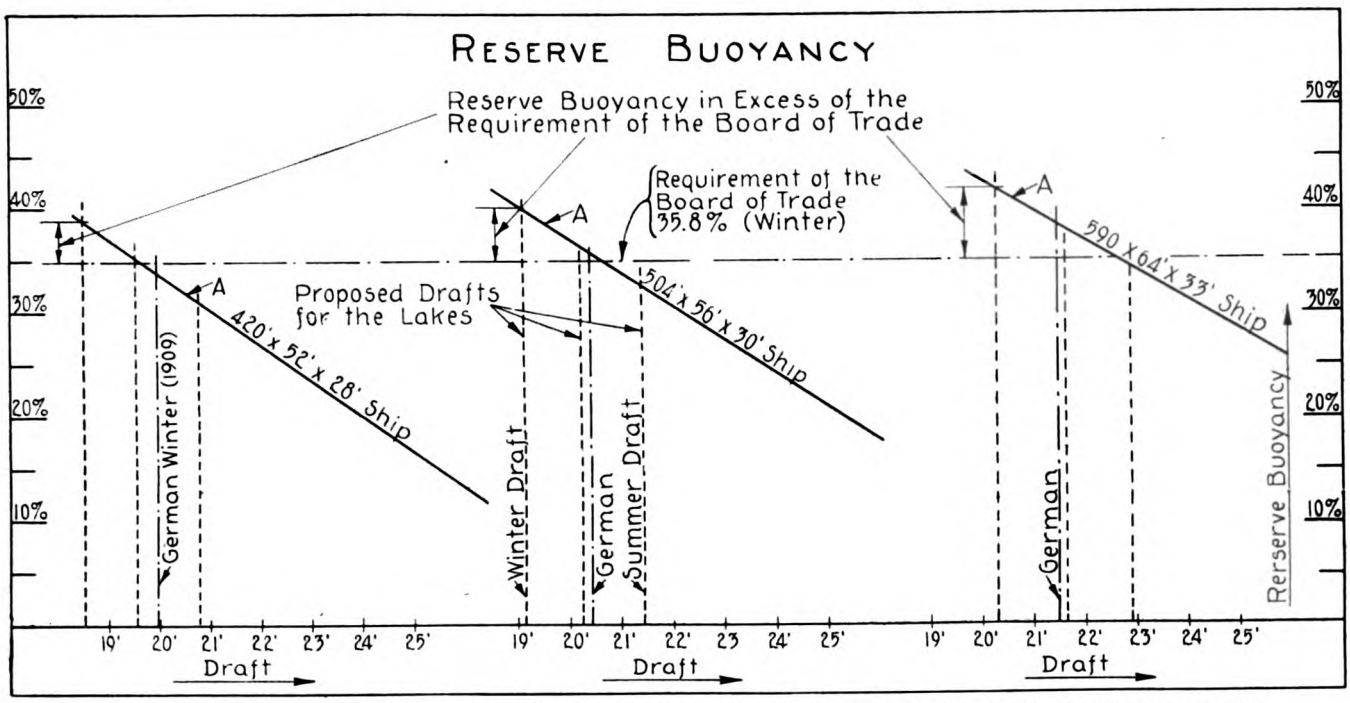


FIG. 11—RESERVE BUOYANCY OF LAKE VESSELS AT DRAFTS PROPOSED IN TENTATIVE FREEBOARD TABLE

ing the latter part of November, it amounts to 1¼ inch per foot of draft as compared with the winter freeboard increase of only ¼ inch per foot of draft which is proposed in the British report.

In Fig. 11 are also plotted the drafts which would result if the present German freeboard regulations (Vorschriftender See-Berufsgenossenschaft) were followed. These drafts are computed from tables in "Hilfsbuch fur Schiffbau." The diagrams indicate that on the lake freighters, the reserve buoyancy is much in excess of the requirements of both the British board of trade and the German regulations.

These vessels have then, clearly, an ample margin of reserve buoyancy at the proposed drafts. It is, however, well to remember that the provision of a large amount of reserve buoyancy is not sufficient in itself to ensure the safety of a vessel in the flooded condition. Only in conjunction with an efficient subdivision is it possible to take full advantage of the reserve buoyancy. This phase of the problem will be treated more in detail in a later chapter.

Height of Working Platform

Experience gained in the actual operation of different types of vessels has early focused attention on this element in fixing a proper freeboard. This question has also been the subject for some interesting investigations.

In a paper read at a meeting of Die Schiffbautechnische Gesellschaft in 1901, Herr Rudolf Rosenstiel describes some complete investigations of the behavior of ships among waves; and he discusses the influence of waves in determining the needed height of deck platform.*

He points out that this consideration for larger vessels will permit, in general, a less freeboard than has been considered necessary from the viewpoint of reserve buoyancy. He also shows that when a vessel is supported by waves shorter than the length of the vessel, the

*Die Entwickelung der Tieflade-Linien an Handelsdampfern von Rud. Rosenstiel. Yahrbuch der Schiffbautechnischen Gesellschaft. 1901.

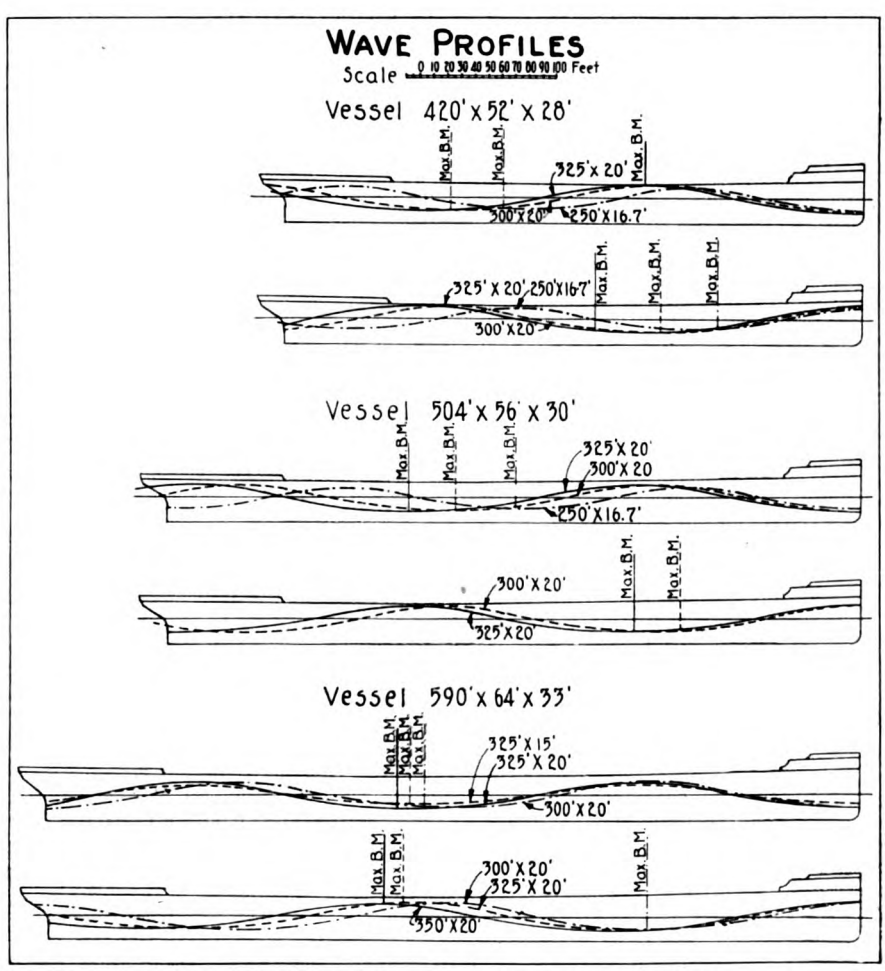


FIG. 12—CHARACTERISTIC LAKE WAVE PROFILES

sinkage of the vessel will always be smaller than when supported by waves of the vessel's length. This condition of wave support, with waves shorter than the vessel, is the one for which our calculations for the lake freighters have to be made.

In a paper by J. Foster King, read in 1906 before the Institution of Naval Architects, ‡ it is shown that, as a rule, the worst conditions are, when a ship, is on the crest of a wave. In this condition, a vessel of full block coefficient is liable to sink deeper than a vessel with a smaller block coefficient. The sinkage was, however, in no case larger than 5 per cent of the height of the wave.

For the lake freighters, Fig. 12 seems to indicate that only for the smaller vessels, of 420 feet and under, is there any danger that the wave profile will rise above the deckline. The strength calculations for the 420 x 50 x 28-foot vessel did not show, however, any case where this condition was reached even with the ship resting on waves 20 feet high. But these calculations were not complete enough in this respect to prove absolutely that for the 420-foot ship, loaded to 19 feet, with a molded depth of 28 feet, is sufficient to provide a safe height of deck platform under all conditions, even though it appears to be so.

Where the molded depth is 30 feet, or more, on the large lake freighters, there is no doubt that they have sufficient "height of platform" at the proposed drafts to permit the safe navigation of these ships.

In this connection it is worth noting that the high forecastle on these vessels adds to the safety in this respect.

Even with vessels having sufficient freeboard, experience has shown that owing to rolling and pitching in bad weather some amount of water will always be shipped aboard, which will hinder the crew in moving about the deck. In ocean going ships it is common to provide raised gangways to overcome this difficulty. The lake freighters are required by the United States steamboat inspection service to rig up wires and bosun's chairs so that communication can always be maintained between the forecastle and the aft end of the vessels.

Of late, greater attention has been given to the question of the construction of the hatches and deckhouses so that possible damage to them by the waves will be avoided. The hatch coamings on the lake freighters are, as a rule, of a strong construction, but they are not as high as on ocean going vessels. The hatch covers, in most cases of steel, and the fittings for securing them to the coamings are, in general, strong and reliable and apparently well up to the standard of ocean going ships. On very few lake freighters are there still any wooden deckhouses. Experience has shown conclusively that by making the deckhouses of steel a better protection is provided against damage and the danger of swamping of the boiler and engine rooms.

By careful attention to details of the construction such as doors, coal hatches, companionways and ventilators this danger can also be further reduced.

(To be continued)

‡"Notes on the Freeboard Rules" by J. Foster King. Trans. I. N. A. 1906.

Pittsburgh River Traffic

Freight tonnage moved on the rivers in the Pittsburgh district increased from 2,644,914 net tons in September to 2,802,403 tons in October. In the like month last year, the total was 3,059,824 net tons. October record is:

Commodity	Allegheny river, short tons	Monongahela river, short tons	Ohio river, short tons	Total, short tons
Coal	77,597	1,592,776	366,668	2,037,041
Coke	0	38,688	0	38,688
Gasoline	940	1,000	0	1,940
Gravel	133,480	106,865	72,650	312,995
Packet cargo	0	0	4,535	4,535
Sand	141,810	137,853	92,983	372,646
Steel products	0	20,425	9,755	30,180
Unclassified	250	2,848	1,340	4,438
Total	354,077	1,900,455	547,931	2,802,463

Late Flashes On Marine Disasters

Brief Summaries of Recent Maritime Casualties— A Record of Collisions, Wrecks, Fires and Losses

Name	Date	Nature	Place	Damage Resulting
Ariel	Oct. 11	Fog, ashore	St. Ignace	Released
Alexander McDougall	Oct. 13	Ashore	Cordell Point, L. Superior	Not stated
Albert Ballin	Oct. 9	Fire	New York	To cargo
Algerine	Oct. 13	Ashore	Brodie Island	Resting easily
Aberdeen	Oct. 14	Ashore	Black Ledge, Seal Island	May be total loss
Andrew McDonald	Oct. 12	Fog, col.	Off West Chop lighthouse	Slight abv. waterline
Ashbee	Oct. 27	Disabled	Delaware Breakwater	Eng. trouble
Agwistone	Oct. 24	Grounded	nr. Gamboa	Not stated
Ary	Oct. 27	Disabled	at sea	Steerer broke
Algonquin	Oct. 29	Disabled	Colon	Rudder pintles gone
Angleterre	Oct. 31	Ashore	Bahamas	Not stated
Audrey P. Brown	Oct. 25	Heavy weather	at sea	Lost deckload
Ada A. McIntyre	Nov. 1	Ashore	Schodack Point	Breaking up
Bearport	Oct. 8	Grounded	Port Ludlow, Puget Sound	Jettis. cargo
Bluefields	Oct. 17	Storm	off Mobile	Destroyed
Beaufort	Oct.	Broke adrift	at sea	Not stated
Butterfield	Nov. 4	Ashore	Mackinaw Point	Undamaged
Cetus	Oct. 11	Fog, col.	off White Fish Point	Damaged
Cragismere	Oct. 11	Collision	Lake Huron	Slight
Cape Blomidon	Oct. 1	Ashore	Port Hawkesbury	Undamaged
Caloric	Oct. 11	Disabled	Southampton	Not stated
Chuky	Oct. 17	Collision	Panama	Damaged
Claremont	Oct. 17	Gale, drifting	off Columbia River	Boil. leak., eng. dis., boatsdam.
Cape Blomindon	Oct. 9	Grounded	Grand Point	Undamaged
Clearwater		Grounded	Mississippi River	Undamaged
Coulee	Oct. 18	Grounded	Rockefeller shoal	Undamaged
Cornish	Oct.	Collision	Long Island Sound	Bow plates bent
Carroll K. West	Oct. 30	Storm, ashore	W. of Ashtabula	Jettis. cargo
Columbia	Oct. 24	Fire	Camden, N. J.	Slight
Chehaw	Oct. 20	Disabled	Wilmington, N. C.	Leaky condition
Chilore	Oct. 31	Grounded	nr. North Point	Floated
Charlie and Willie	Oct. 31	Fire	New York	Considerable
Daghild	Oct. 11	Explosion	45 m. below Philadelphia	Not stated
Dolly C.	Oct. 10	Ashore	nr. Quillaute River	Floated
Davanger	Oct. 24	Struck sub. obj.	Boston	Prop. blade gone
D. M. Philbin	Oct. 28	Disabled	Duluth	Leaky boiler
District of Columbia	Oct.	Collision	San Pedro	Slight
Defiance	Nov. 4	Ashore	Mackinaw Point	Undamaged
Equator	Oct. 10	Ashore	nr. mouth of Quillaute River	Sunk
El Lobo	Oct. 10	Ashore	nr. Vancouver, B.C.	Not stated
E. R. Kemp	Oct. 12	Struck sub. obj.	at sea	Lost prop. blades
Ecuador	Oct. 16	Unknown	San Pedro	20' water in hold
Ensley City	Oct. 22	Disabled	Manila	Crank shaft broke
Eugenie	Oct. 14	Ashore	Nals Head	Total wreck
Elizabeth	Nov. 1	On rocks	Bandon, Ore.	Floated
E. R. Haggett	Nov. 2	Leaking	Delaware river	Pumps dis.
Fidget	Oct. 7	Sank	Gulf of Mexico	Total loss
Fort Pierce	Oct. 24	Sank	off Chincoteague, Va.	Deckhouse abv. water

Late Flashes On Marine Disasters

Brief Summaries of Recent Maritime Casualties— A Record of Collisions, Wrecks, Fires and Losses

Name	Date	Nature	Place	Damage Resulting
Freeman	Oct. 12	Fog, col.	off West Chop	To stem & plates
Frances L. Robbins	Nov. 4	Ashore	Lake Michigan	Jettis. cargo
Frances L. Robbins	Nov. 6	Grounded	5 m. from Green Bay	Not stated
Gedania	Oct. 12	Ashore	Canso	Not in danger
Greater Buffalo	Oct. 27	Damaged at launching	Lorain	Frame cracked, rudder twisted
Garrett	Oct. 25	Disabled	Delaware Breakwater	Rudder dis.
Huronton	Oct. 11	Fog, col.	off White Fish Point	Total loss
Henry Steinbrenner	Oct. 11	Collision	off Parisian Island	Plates smashed
Hellene S.	Oct. 9	Fire	St. Vincent	Ceiling dam.
Hugoton	Oct. 21	Disabled	Panama	Prop. dam.
H. H. 2 (scow)	Oct. 18	Disabled	Sandy Hook	In tow
Harry A. McLennan	Oct. 25	Storm	at sea	Sails slit, headstays gone
Hannington Court	Nov. 1	Fire	at sea	To cotton
Herman Frasch	Nov. 1	Collision	St. Lawrence	Not stated
Iron King	Oct. 18	Fire	New York	Cargo cons. damaged
J. M. Kennedy	Oct. 11	Collision	off Parisian Island	Bow stove in
Jean Dundonald Duff	Oct. 16	Abandoned	at sea	On fire
J. M. Danziger	Oct. 24	Collision	Elizabethport	Damaged
J. J. Hill	Oct. 22	Disabled	Cleveland	Buckets off wheel, plates damaged
James B. Davidson	Oct. 27	Grounded	Lake St. Clair	Undamaged
J. H. B. Hagarty	Oct.	On bottom	Port Colborne	Damaged plates
J. M. Guffey	Oct. 24	Strained bulkheads	at sea	Rivets leak.
Kennecott	Oct. 8	On rocks	off Frederick Island	Not stated
Karachi Maru	Oct. 13	Disabled	Delaware Breakwater	Tail shaft fractured
Kingsway	Oct. 18	Disabled	New York	Windlass broke
King Frederick		Ashore	Not stated	Damaged
Luzon	Oct. 7	Ashore	Passage Island	30 plates damaged
Little Silver	Oct. 15	Disabled	New York	Not stated
Lena Luckenbach	Oct. 25	Disabled	Galveston	Eng. trouble
Lavada	Oct. 24	Collision	Port Arthur	Undamaged
Leopold Adler	Oct. 24	Collision	nr. Baytown	Undamaged
Moerdijk	Oct. 8	Disabled	Colon	Furnace leaky
Mirjam	Oct. 2	Ashore	Black Ledge	Wrecked
Munrio	Oct. 13	Collision	off Humboldt, Cal.	Leak. badly
Mary	Oct. 16	Ashore	Sanchez	Undamaged
Morning Star	Oct. 22	Ashore	off Sydney	Not stated
Macerata	Oct. 23	Gale	Delaware Breakwater	Dragged, undamaged
Munindies	Oct. 17	Collision	Panama	Not stated
Mabel	Oct.	Abandoned	at sea	Full of water fwd.
Marore	Oct. 26	Grounded	Sparrows Point Channel	Floated
M. H. Kongshavn	Oct. 25	Ashore	Briar Island	Leak and lost shoe
Mascotte	Oct. 27	Disabled	Charleston	Leaking
Masula	Oct. 24	Collision	Port Arthur	Undamaged
Montague	Nov. 1	Ashore	nr. Kannonzaki	Unknown
Munargo	Nov. 2	Grounded	Neuvitas	Not stated
Marie de Ronde	Nov. 3	Disabled	off Tortugas	Leak. badly
M. Shiras	Oct. 31	Grounded	Calcite	To 16 plates
N. C. Nessen	Oct. 11	Fog, ashore	N. of Green Bay	Not stated
Nellie Dixon	Oct. 1	Gale	off Sambro	Lost sail, rudder dis.
Niagara	Oct. 9	Disabled	nr. Havre	Broke strbd. screw
Normandye	Oct.	Storm	off Havre	Believe lost
Nicaro	Oct. 18	Storm, on side	Dry dock, New Orleans	In mud, listing
Niobe	Oct. 18	Ashore	entrance to Bizerta	Floated
Naperian		Collision	River Scheldt	Dam. below waterline
N. P. No. 6	Oct. 25	Capsized	New York	Not stated
Newona	Oct.	Disabled	Norfolk	Boil. trouble
Nordhavet	Oct. 30	Disabled	St. Lucca	Boiler burst
Norma	Oct. 28	Disabled	New Orleans	Eng. breakdown
New Mexico	Nov. 3	Collision	San Pedro	Not stated
O. M. Poe	Oct. 16	Grounded	Duluth	Jettis. cargo
Orion	Oct. 18	Grounded	Nixs Mate Bar	Undamaged
Ocean Plunger	Oct. 26	Collision	Puget Sound	Undamaged
Poplar Bay	Oct. 12	Struck lock	Welland canal	Not stated
Palm	Oct. 17	Fire	Barmandt	Heavy
Portuense	Oct. 19	Abandoned	at sea	On fire
Petcol	Oct. 19	Ashore	Saginaw bay	Jettis. cargo
Progress	Oct. 24	Grounded	nr. Amherstburg	Undamaged
Peggie	Oct. 26	Fire	Harlem River	Slight
Princeton	Oct. 24	Fire	Camden, N. J.	Super. badly dam.
Pawnee	Oct. 26	Disabled	San Pedro	Eng. trouble
Princess Patricia	Oct. 26	Collision	Puget Sound	Undamaged
Pocone	Nov. 2	Disabled	150 m. from Bermuda	Rudder gone
Queen	Oct. 10	Disabled	nr. British Columbia	Cracked cylinder
Quincy	Nov. 1	Collision	N. of Barnegat	Bows dam.
Regulus	Oct. 11	Collision	Lake Huron	Broken hawse pipe
Roma	Oct. 10	Disabled	Providence	Crankshaft broke
Rebecca G. Whillden	Oct. 19	Ashore, foreboom broke	off Graves	In tow, leak.
Rachel	Oct. 19	Ashore	E. of Fort Morgan	Not stated
Robin Gray	Oct. 25	Grounded	San Pedro	Not stated
Rose City	Oct. 23	Collision	Portland, Oreg.	Slight
Rose Helen	Nov. 1	Collision	St. Lawrence	Slight to stern
Sunland	Oct. 9	Ashore	nr. Seattle	Floated
Stanley Dollar	Oct. 14	Fire	San Francisco	To cargo
Suedco	Oct. 19	Drifted,	Port Arthur	Slight
Startle	Oct. 19	Disabled	Delaware Breakwater	Hole in boiler
San Gil	Oct. 23	Ashore	Caribbean Sea	Pounding heavily
Samuel Mather	Oct. 20	Ashore	Keweenaw Point	Rudder, shoe and plates dam.
Stella F. Haber	Oct. 30	Storm, ashore	W. of Ashtabula	Jettis. cargo
Saxon Prince	Oct.	Fire, beached	London	Not stated
Sosua	Oct. 23	Ashore	Utilla Bay, Honduras	Floated
Suboatco	Nov. 1	Collision	N. of Barnegat	Dam. abv. waterline
Sucrosa	Oct. 29	Disabled	at sea	Lost prop. blade
Shinkoku Maru	Nov. 3	Disabled	at sea	Tail shaft broke
S. C. T. Dodd	Nov. 3	Collision	San Pedro	Ser. dam.
Satilla	Oct.	Broke adrift	at sea	Not stated
Tropical	Oct. 1	Stranded	nr. Puerto Padre	Jettis. cargo
Tempate	Oct. 10	Ashore	nr. Abaco	Not stated
Tejon	Oct. 13	Collision	off Humboldt, Cal.	Damaged
Tamiahua	Oct. 18	Lost prop.	100 m. off Tampico	In tow
Tom Beattie	Oct. 13	Full of water	Portland	Not stated
Twilight	Oct. 24	Fire, sank	Camden, N. J.	Considerable
Vera	Oct. 5	Ashore	Eastern Harbor	May be total wreck
Vildfugl	Oct. 15	Ashore at Jamaica	New York	Eng. rm. tank leak.
Vancolite	Oct. 13	Disabled	San Pedro	Eng. trouble
Vika	Oct. 27	Disabled	off Highlands	Feed pump plunger broke
Virginia	Oct. 31	Disabled	off Graves	Machy. deranged
William Fairbairn	Oct. 15	Grounded	nr. South Chicago	Not stated
Wyke Regis	Oct. 9	Disabled	Gijon	Water in eng. room
Willpolo	Oct. 11	Struck bank	Panama Canal	Leak. badly
Wandsbek	Oct. 17	Stranded	Santa Rosalia	Salvage doubtful
West Jaffrey	Oct. 16	Disabled	at sea	Machy. dam.
Whipple	Oct. 18	Grounded	Fontera	Lost wheel
William S. McDonald	Oct. 24	Waterlogged	off Ambrose Channel LS	Abandoned on fire
W. H. Warner	Oct. 25	Struck	Sandusky	10 plates damaged
Willhilo	Oct. 26	Grounded	Baltimore	Floated
Wade Hampton	Oct. 29	Disabled	New York	Air pump broke
Wanderer	Oct. 30	Sank	New York	Not stated
W. H. Tilford	Oct. 24	Collision	nr. Baytown	To plates
West Canon	Oct.	Collision	San Pedro	Slight
W. D. Crawford	Nov. 2	Disabled	Duluth	Steerer trouble
Worrell Clarkson	Nov. 6	Grounded	Lake St. Clair	Undamaged

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923...	462	1,868,446	489	1,993,758
September	428	1,818,981	477	1,978,023
August	468	1,855,045	520	2,039,732
July	462	1,799,886	490	1,962,302
June	466	1,799,908	518	2,075,654
May	500	1,849,548	501	1,874,019
April	469	1,818,531	467	1,788,555
March	477	1,764,093	494	1,857,212
February	395	1,437,919	413	1,529,096
January	423	1,679,843	439	1,690,010
December, 1922.	397	1,569,778	473	1,819,341
November	426	1,626,068	463	1,805,798
October	452	1,846,327	467	1,848,637

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923...	93	241,457	64	178,279
September	92	236,293	74	182,700
August	97	251,295	73	180,771
July	109	269,158	77	177,700
June	102	257,507	69	191,633
May	105	267,441	82	207,209
April	87	218,177	83	229,333
March	111	306,580	76	209,261
February	67	160,678	54	139,701
January	98	287,240	64	182,402
December, 1922..	78	209,962	63	167,736
November	75	221,130	78	241,326
October	80	205,137	73	202,326

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923..	118	354,296	59	156,940
September	117	307,719	79	185,726
August	126	302,391	86	178,706
July	146	337,033	85	174,106
June	176	319,135	128	176,853
May	159	328,183	108	176,845
April	106	328,372	67	197,510
March	106	330,766	51	139,776
February	102	323,880	48	128,949
January	148	429,849	61	160,090
December, 1922.	138	383,366	61	181,975
November	130	357,264	59	123,255
October	149	408,855	91	217,899

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923..	19	39,456	15	32,471
September	9	22,724	10	25,582
August	11	24,155	8	18,838
July	8	18,148	9	17,770
June	7	22,613	8	25,941
May	8	16,470	11	17,781
April	22	75,012	29	100,274
March	29	94,128	31	83,391
February	33	91,190	36	100,312
January	49	144,429	42	126,949
December, 1922.	48	144,019	48	136,247
November	22	45,567	21	46,755
October	27	60,114	22	49,594

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October 1923..	8	30,248	9	24,821
September	9	31,514	12	41,646
August	9	34,323	9	27,664
July	10	25,155	7	29,316
June	7	25,466	5	17,238
May	9	31,731	8	38,870
April	10	33,783	12	41,352
March	8	31,910	8	34,367
February	17	56,353	10	39,840
January	13	45,175	12	52,651
December, 1922	6	23,609	8	29,871
November	11	47,565	10	31,470
October	9	31,293	9	31,232

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923...	96	285,871	95	297,566
September	94	292,315	99	297,965
August	100	303,073	92	262,306
July	130	390,465	137	395,206
June	140	407,872	135	406,138
May	156	476,041	160	468,248
April	159	470,698	138	416,969
March	123	375,762	117	354,803
February	80	240,133	94	275,291
January	115	322,661	110	306,393
December, 1922..	110	322,948	104	380,616
November	114	361,162	132	403,593
October	97	289,239	101	304,431

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923...	18	56,473	65	188,805
September	14	37,823	65	184,646
August	36	113,070	81	244,366
July	41	108,465	108	296,197
June	36	107,218	66	190,218
May	62	188,850	93	286,420
April	21	65,350	73	212,453
March	16	51,333	71	200,858
February	8	24,958	42	130,121
January	14	41,127	44	121,152
December, 1922..	19	52,716	40	137,081
November	6	21,036	38	118,738
October	17	44,423	46	149,670

Savannah

(Exclusive of Domestic)

Month	—Entrances— No. Ships	Net Tonnage	—Clearances— No. Ships	Net Tonnage
October, 1923..	31	89,817	33	91,089
September	29	82,569	27	83,689
August	18	55,205	20	59,452
July, ...	18	53,071	22	60,711
June	27	77,392	31	90,636
May	26	67,494	23	63,395
April	26	81,582	27	83,365
March	31	95,905	30	89,323
February	31	87,315	31	87,703
January	28	93,564	28	93,587
December, 1922	22	66,619	17	57,279
November	14	41,665	15	40,606
October	19	52,065	19	46,054

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923..	83	103,328	82	95,506
September	69	77,687	74	84,612
August	80	94,591	82	93,028
July	88	96,514	86	97,260
June	93	105,045	93	102,123
May	97	102,033	95	101,422
April	84	85,964	83	88,475
March	91	88,639	90	83,220
February	69	68,735	64	68,658
January	89	81,622	86	79,210
December, 1922.	74	77,623	78	85,839
November	69	71,740	70	71,705
October	61	67,755	64	77,225

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. Ships	Net Tonnage	—Clearances— No. Ships	Net Tonnage
October, 1923..	21	78,191	48	174,275
September	23	86,194	41	138,470
August	17	64,218	31	106,478
July	19	66,048	24	86,474
June	22	87,147	25	87,419
May	16	58,889	21	72,663
April	17	62,287	22	84,940
March	16	69,514	22	78,124
February	13	46,219	18	66,446
January	12	47,848	25	97,674
December, 1922	13	46,245	31	104,065
November	18	63,016	32	106,367
October	24	91,306	26	103,602

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923..	226	605,211	239	649,79?
September	205	548,914	169	444,881
August	235	605,671	249	639,802
July	237	602,017	227	587,966
June	230	584,271	226	572,211
May	221	550,817	237	603,128
April	234	612,572	237	623,539
March	253	648,990	269	682,080
February	204	559,638	206	539,965
January	242	713,589	233	695,524
December, 1922.	211	543,884	222	573,111
November	220	598,306	219	599,150
October	239	630,306	235	625,605

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. Ships	Net Tonnage	—Clearances— No. Ships	Net tonnage
October, 1923..	83	209,343	108	334,544
September	64	164,854	100	290,715
August	69	172,330	92	257,371
July	70	178,601	77	198,200
June	77	178,013	82	209,899
May	78	181,759	97	256,745
April	65	162,317	77	209,388
March	58	170,841	97	287,278
February	48	146,944	76	233,591
January	69	219,967	89	282,889
December, 1922.	64	214,952	79	260,159
November	56	174,964	87	304,352
October	59	156,587	85	260,702

Port Arthur, Tex.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1923	31	88,978	42	121,898
August	45	122,018	56	156,908
July	36	107,997	49	122,785
June	52	161,207	57	174,651
May	59	187,057	64	206,089
April	58	191,158	56	188,376
March	64	188,176	55	169,005
February	52	172,273	44	142,554
December, 1922	59	210,778	65	218,274
November	42	143,551	47	154,010
October	68	227,039	66	217,502
September	53	158,181	57	168,681

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923..	68	123,532	60	120,606
September	60	126,005	52	105,247
August	64	191,968	67	146,193
July	73	136,242	66	123,405
June	64	136,311	61	132,863
May	74	167,509	74	174,851
April	85	199,871	82	163,074
March	88	203,032	88	206,285
February	83	186,479	72	160,777
January	77	145,151	67	153,001
December, 1922.	66	123,746	56	119,821
November	68	147,775	53	130,769
October	59	143,207	52	110,398

Houston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923....	75	24,076	70	268,416
September	66	58,704	61	92,664
August	58	43,258	56	211,348
July	48	42,447	48	177,666
June	49	72,875	50	197,081
May	54	60,640	50	182,691
April	47	72,722	55	119,521
March	54	69,428	51	135,906
February	49	50,379	48	167,872
January	49	36,744	52	146,532
December, 1922...	58	70,948	53	195,322
November	65	72,192	63	215,043
October	55	57,106	53	168,254

Marine Business Statistics Condensed

Port Traffic Record

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923...	56	205,175	71	249,035
September	43	165,798	63	209,930
August	64	208,625	65	224,918
July	68	244,530	58	189,348
June	59	204,204	65	227,566
May	64	230,778	69	244,321
April	61	199,831	63	227,467
March	50	168,399	71	237,195
February	47	165,333	60	214,686
January	51	156,249	65	216,083
December, 1922..	54	187,648	68	234,385
November	42	154,024	42	154,280
October	59	159,855	69	261,687

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1923	88	257,074	110	193,177
August	80	193,400	63	161,380
July	78	265,294	56	187,987
June	87	212,483	53	175,799
May	78	246,275	53	179,360
April	87	269,264	72	165,302
March	115	251,459	90	185,155
February	86	148,957	83	137,564
January	91	153,564	92	141,332
December, 1922.	133	132,114	76	83,537
November	110	111,803	111	112,934
October	117	115,548	138	94,522
September	61	127,969	96	133,561

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
October, 1923..	39	184,717	47	200,668
September	32	142,052	40	159,006
August	39	173,885	37	163,188
July	30	148,607	32	149,239
June	36	147,186	39	184,732
May	29	133,752	37	159,393
April	32	141,569	31	133,950
March	28	129,070	30	138,428
February	26	120,548	39	156,258
January	27	125,551	36	155,129
(Inclusive of Domestic)				
December, 1922.	201	560,159	198	564,367
November	138	374,871	139	374,871
October	164	417,901	148	406,498

Soo Canal Report

Traffic through the Soo canal in October spurted ahead of September despite the slackening in trade generally found toward the close of the navigation season. Last month's total was 13,002,677 net tons against 12,776,048 net tons in September. The October total is the second highest for that month in the past seven years.

The following table shows the October trade in the past seven years:

	Net tons
October, 1923	13,002,677
October, 1922	11,232,668
October, 1921	6,652,395
October, 1920	13,000,299
October, 1919	9,713,319
October, 1918	13,363,287
October, 1917	12,646,066

This year's Soo commerce, divided by commodities up to Oct. 31, follows:

EASTBOUND	
Lumber, M. ft. B. M.	182,851
Flour, barrels	7,872,860
Wheat, bushels	164,330,301
Grain, bushels	56,173,138
Copper, net tons	48,659
Iron ore, net tons	53,811,720
Pig iron, net tons	17,644
Stone, net tons	21,880
General merchandise, net tons.	46,735
Passengers, number	28,101
WESTBOUND	
Coal, soft, net tons	14,677,456
Coal, hard, net tons	1,398,306
Iron ore, net tons	158,543
Manufactured iron and steel, net tons	68,832
Salt, net tons	61,513
Oil, net tons	155,883
Stone, net tons	611,585
General merchandise, net tons	475,590
Passengers, number	27,920
SUMMARY	
Vessel passages, number	18,894
Registered tonnage, net	59,355,259
Freight:	
Eastbound, net tons	61,368,164
Westbound, net tons	17,607,711
Total freight, net tons	78,915,875

Record of Traffic Through Panama Canal

		Atlantic to Pacific traffic —Panama Canal— No. of ships	Net tonnage	Tons of cargo	Pacific to Atlantic traffic —Panama Canal— No. of ships	Net tonnage	Tons of cargo	Total traffic through canal —Panama Canal— No. of ships	Net tonnage	Tons of cargo
1923										
September	American	111	598,331	251,797	126	686,359	1,132,572	237	1,284,690	1,384,369
	Foreign	87	382,506	259,922	89	377,356	524,412	176	759,862	784,334
	Totals	198	980,837	511,719	215	1,063,715	1,656,984	413	2,044,552	2,168,703
August	American	157	825,056	435,851	127	670,023	1,071,457	284	1,495,079	1,507,308
	Foreign	104	445,708	302,749	66	291,803	358,693	170	737,511	661,442
	Totals	261	1,270,764	738,600	193	961,826	1,430,150	454	2,232,590	2,168,750
July	American	146	743,072	361,335	139	751,940	1,194,357	285	1,495,012	1,555,692
	Foreign	109	464,386	328,697	80	350,629	453,395	189	815,015	782,092
	Totals	255	1,207,458	690,032	219	1,102,569	1,647,752	474	2,310,027	2,337,784
June	American	131	705,481	385,843	115	607,950	1,022,421	246	1,313,431	1,408,264
	Foreign	96	405,816	270,146	75	316,655	418,036	171	722,471	688,182
	Totals	227	1,111,297	655,989	190	924,605	1,440,457	427	2,035,902	2,096,446
May	American	133	715,061	406,699	120	651,504	1,096,175	253	1,366,565	1,502,874
	Foreign	96	424,600	335,652	70	337,249	426,557	166	761,849	762,209
	Totals	229	1,139,661	742,351	190	988,753	1,522,732	419	2,128,414	2,265,083
April	American	123	662,300	331,114	116	637,178	1,041,481	239	1,299,478	1,372,595
	Foreign	81	360,318	322,255	84	347,894	492,295	165	708,212	814,550
	Totals	204	1,022,618	653,369	200	985,072	1,533,776	404	2,007,690	2,187,145
March	American	119	635,992	348,598	96	509,443	819,204	215	1,145,435	1,167,802
	Foreign	114	505,290	329,890	80	337,467	443,236	194	842,757	773,126
	Totals	233	1,141,282	678,488	176	846,910	1,262,440	409	1,988,192	1,940,928
February	American	97	486,186	325,835	82	422,871	633,458	179	908,673	959,293
	Foreign	78	354,190	237,604	69	266,300	366,381	147	620,874	603,985
	Total	175	840,376	563,439	151	689,171	999,839	326	1,529,547	1,563,276
January	American	88	450,254	313,094	67	320,300	462,245	155	770,554	775,339
	Foreign	106	473,524	285,649	91	366,614	530,944	197	840,138	816,593
	Total	194	923,778	598,743	158	686,914	993,189	352	1,610,692	1,591,932
1922										
December	American	78	363,857	328,924	68	344,847	551,907	146	710,704	880,831
	Foreign	83	352,020	231,494	75	312,539	422,777	158	664,559	654,271
	Total	161	717,877	560,418	143	657,386	974,684	304	1,375,263	1,535,102
November	American	65	324,783	234,500	55	273,293	416,515	120	598,076	651,015
	Foreign	83	370,180	266,878	91	369,024	508,967	174	739,204	775,845
	Total	148	694,963	501,378	146	642,317	925,482	294	1,337,280	1,426,860
October	American	70	328,229	264,171	51	250,606	385,196	121	578,835	649,367
	Foreign	89	384,223	300,904	84	347,334	495,592	173	731,557	796,496
	Total	159	712,452	565,075	135	597,940	880,788	294	1,310,392	1,445,863
September	American	54	260,249	226,741	53	235,008	315,898	107	495,257	542,639
	Foreign	72	322,167	241,095	61	252,986	354,454	133	575,153	595,549
	Total	126	582,416	467,836	114	487,994	670,352	240	1,070,410	1,138,188
		Vessels in Ballast								
1923										
September	American	59	352,792	0	1	5,233	0	60	358,025	0
	Foreign	19	85,041	0	3	12,121	0	22	97,162	0
	Totals	78	437,833	0	4	17,354	0	82	455,187	0
August	American	82	477,284	0	2	6,073	0	84	483,357	0
	Foreign	24	100,910	0	3	9,581	0	27	110,491	0
	Totals	106	578,194	0	5	15,654	0	111	593,848	0
July	American	76	443,654	0	4	12,848	0	80	456,502	0
	Foreign	25	107,103	0	3	9,580	0	25	116,683	0
	Totals	101	550,757	0	7	22,428	0	105	573,185	0
June	American	70	422,173	0	0	0	0	70	422,173	0
	Foreign	27	118,540	0	2	7,255	0	29	125,795	0
	Totals	97	540,713	0	2	7,255	0	99	547,968	0
May	American	72	422,947	0	3	10,658	0	75	433,605	0
	Foreign	23	87,784	0	2	4,750	0	25	92,534	0
	Totals	95	510,731	0	5	15,408	0	100	526,139	0
April	American	67	393,895	0	3	18,837	0	70	412,735	0
	Foreign	11	44,214	0	2	9,412	0	13	53,626	0
	Totals	78	438,109	0	5	28,249	0	83	466,358	0
March	American	60	359,006	0	4	7,841	0	64	366,847	0
	Foreign	35	144,223	0	3	9,915	0	38	154,138	0
	Totals	95	503,229	0	7	17,756	0	102	520,985	0
February	American	36	229,578	0	0	0	0	36	229,578	0
	Foreign	24	105,848	0	3	7,486	0	27	113,334	0
	Total	60	335,426	0	3	7,486	0	63	342,912	0
January	American	29	181,617	0	2	10,141	0	31	191,758	0
	Foreign	26	109,586	0	1	4,942	0	27	114,528	0
	Total	55	291,203	0	3	15,083	0	58	306,286	0

What the British Are Doing

Short Surveys of Important Activities in Maritime Centers of Island Empire

LABOR troubles continue to be the most serious element in the British shipbuilding situation. Walter Runciman, one of the heads of the industry, stated in October that dozens of vessels which might have been repaired in English yards have been sent over to the Continent chiefly to Antwerp, Rotterdam and Hamburg. A great deal of optimism emerged in connection with the repeated meetings arranged by the trade unionists with the boilermakers' union; but the solid fact remained that late in October no agreement had been reached. A national conference was called to be held at York on Oct. 23 to discuss the dispute.

The boilermakers have asked for arbitration, but their fellow trade unionists do not agree to this seeing that the boilermen are bound by the same agreement as non-striking shipyard workers. The dispute up to Oct. 19 had lasted 24 weeks and entailed a loss of at least £5,000,000 while 10,000 boilermakers have been locked out and 60,000 men in other lines of labor have been rendered idle in consequence. In the meantime, production has been brought to the lowest point reached over a long period of years.

* * *

A TRIAL trip was run in October, by the BLUESTONE, a steel self-trimming collier built for the Crete Shipping Co., Ltd., by Swan, Hunter, & Wigham Richardson, Ltd., at its Wallsend, England, shipyard. The speed attained was 9½ knots.

The BLUESTONE is 235 feet in length between perpendiculars, 36 feet in width and has a molded depth of 17 feet 6 inches. She has a raised quarter deck about 146 feet long and a top gallant forecastle about 25 feet long. She will carry about 2100 tons deadweight on a draft of 16 feet 2¾ inches. Two cargo holds have four large hatchways and are served by a full equipment of steel derricks for rapid loading and discharging. Water ballast is carried in a double bottom all fore and aft, also in the fore and after peaks. The steam steering gear is placed in the engine casing on the raised quarter deck and a steam warping capstan is provided on the after end of the raised quarter deck. Accommodation is provided for the captain, officers and wireless operator with saloon on the after end of the raised quarter deck in deckhouses at the fore end of the boiler casings, and for the engineers and petty officers in side-houses abreast the engine casing, the seamen and firemen being berthed in the forecastle. The ship is lighted throughout by electricity and the officers' accommodation is steam heated.

The engines which are fitted at the after end of the ship are of the triple expansion type, and steam is supplied from two cylindrical boilers. Both engines and boilers have been installed by the Neptune works of Swan, Hunter & Wigham Richardson, Ltd.

* * *

USEFUL figures and suggestions were given by Prof. J. H. Jones of Leeds university in a lecture on the industrial outlook. The speaker said the shipbuilding industry in Glasgow and the Clyde valley was slightly larger than that of the Tyne, Wear and Tees, the principal English shipbuilding centers combined. The capacity had probably increased about 20 per cent since war broke out. Before the war, about one-fifth of the output consisted of ships of war. An urgent need was the establishment of a new Essen on the Clyde in which the iron and steel works would be equipped with the most modern devices as many of the iron and steelworks now are out of date. If necessary, the government should give a certain amount of financial support.

* * *

IN VIEW of the depression of trade a number of Glasgow shipbuilding yards applied to the authorities for a reduction of 33⅓ per cent in the valuation of their premises for taxing purposes. It is now stated that a reduction of 12½ per cent on this ground has been allowed.

* * *

THE first cruise has just been made by the diesel-electric ship LA PLAYA built by Cammell Laird & Co. Birkenhead, for the United Fruit Co., Boston, Mass. A number of technical representatives of leading British shipping companies and other experts were on board. The vessel is 325 feet long and has been built for the banana trade, being able to carry 7,000,000 bananas every voyage. Her service speed is 13 to 14 knots and the propelling machinery consists of Cammell Laird Fullagar diesel engines coupled to electric generators supplying current for propulsion purposes. This is the first ocean going ship of this type to be built and the trial performances were considered remarkably successful. Two similar vessels are under construction for the same owners by Cammell Laird.

* * *

BOARD of Trade is considering the substitution of rafts for lifeboats on ocean going ships. The raft occupies much less space, enabling a larger number to be carried. Another reform has to do with the clothing of the passengers in case of emergency. On an ordinary computation, it is considered that six hours is usually required before a ship involved in accident can be located by wireless In that time women and children may be chilled through and it is suggested that a thin garment which retains the heat of the body should be carried in the lockers of the rafts so that passengers can put them on immediately.

* * *

A NEW dock is in course of construction at Swansea which is to be much larger than any now existing in the Channel. The entrance lock is 870 feet long, 90 feet wide, and 33 feet deep. It is to be fitted with electric traveling cranes of capacities up to ten tons. The dock is being constructed by Messrs. Palmer of Jarrow-on-Tyne. It is expected to be finished this year and a second dock of still larger dimensions will then be commenced.

* * *

SIR JOSEPH BROODBANK in his presidential address to the Institute of Transport dealt with the complaint by shipowners that dockowners were chary of spending money to accommodate ships of 50,000 to 80,000 tons. The answer was that the business was not good enough. Docks for these leviathans were so costly that even if every berth were always occu-

pied the tariff rates on the vessels would never yield a fair return on the outlay. Such vessels would invariably be passenger vessels with little cargo. The cargoes of the BERENGARIA and the MAJESTIC hardly exceeded in tonnage the weight of the human beings on board. Passengers paid little or nothing to the dock authority, however well they might pay shipowners or railway company. The giant passenger vessels ought to be berthed at tidal landing stages.

* * *

VICKERS Ltd. have turned out from their yards at Barrow-in-Furness the first of two steam colliers to the order of William France Fenwick & Co. The feature of the ship is that it is the first to be built at Barrow without a single hand-driven rivet. All the intricate plating has been successfully manipulated without a furnace being lighted. The ship was delivered by contract on time although the trade representing more than half the labor cost has been locked out since April 30.

* * *

SEVERVE depression of shipbuilding on the Clyde is reflected by the large number of unemployed. It is estimated that in Greenock, 10,000 are unemployed or partly unemployed. In Port Glasgow it is believed that about seven-eighths of the working population are idle. Part of this unemployment is due to the boilermakers' lockout.

A number of relief schemes are in course of preparation for finding work during the winter.

* * *

AN ORDER for a steel screw coasting tanker of 115 tons deadweight capacity has been placed by the Anglo-American Oil Co., Ltd., London, a subsidiary of the Standard Oil Co. with James Pollock Sons & Co., Ltd., London, and Faversham, Kent, England. She will be fitted with a 135-brake horsepower Bolinder heavy oil engine with several special features, including electric starting.

Yokohama Fights To Regain Old Rank

By Our Japanese Correspondent

YOKOHAMA is anxious to learn whether it has been permanently reduced from the rank of Japan's foremost trading port to a mere seaside village of a hundred sheds and heaps of debris. The earthquake and conflagration which thus turned the fine port into a scene of desolation has also destroyed one of the best freight markets in the East. No more of that great concourse of steamers from all parts of the world is seen. It will be an exceedingly arduous task to restore the port to its former dignity. American shipowners whose sympathy with Japan in her moments of distress has been striking now prove the first to offer their good offices to people at the port who are taking up that task of rebuilding. Nearly all office buildings on the waterfront collapsed in the earthquake of Sept. 1. Breakwaters were only slightly damaged, but quays were destroyed. Parts sank down into the sea. Quay walls were also damaged badly and are out of shape. The earthquake shook off only the roofs of custom sheds. The office buildings of the custom house were also only slightly damaged by the earthquake. However, the fire destroyed them all with the exception of a few sheds.

The fire destroyed sampans and lighters while the dockyards at the port which h d been half demolished by the earthquake were almost completely destroyed by the fire.

Yokohama has thus been robbed of all its value as a trading port. Time is required to reconstruct all harbor accommodations and shipping companies and trading firms are seeking safer places either at Osaka or Kobe. The transpacific mail services were, for instance, announced to have adopted Kobe as their new terminus.

Yokohama people started their endeavors to retain the raw silk business in the port's hand immediately after their great disaster. They have been confronted, however, by many sorts of difficulty. They are not yet fully successful in their endeavors to prevent the seat of their raw silk trade from going over to Kobe. The main cause for their half success is found in the shifting of shipping to Kobe and Yokohama's hope is now concentrated on shipping coming back to its port.

American Ships Resume Calls

The first to come to Yokohama's rescue in this trying moment is America. The manager of the Admiral Line who had sought refuge on the American warship HURON established his temporary office among the debris late in September. He instructed all his men to come to Yokohama. The line's steamers are calling at Yokohama as regularly as in pre-earthquake days. His example is being followed by several other American lines. At the time of writing, his announcement is fully carried out and the PRESIDENT MADISON and several other American steamers are in the port.

The moral effect of this American sympathy on Yokohama people is inspiring. Dr. Maki, prominent civil engineer, has been appointed as Yokohama's chief engineer. His men, reinforced with army engineers, are repairing half destroyed quays and quay walls. On land, an army of carpenters are employed to build sheds. Dr. Maki says that the life of Yokohama lies in its harbor. The harbor must be restored as quickly as possible. Although some people talk about its complete remodeling it must be postponed until later.

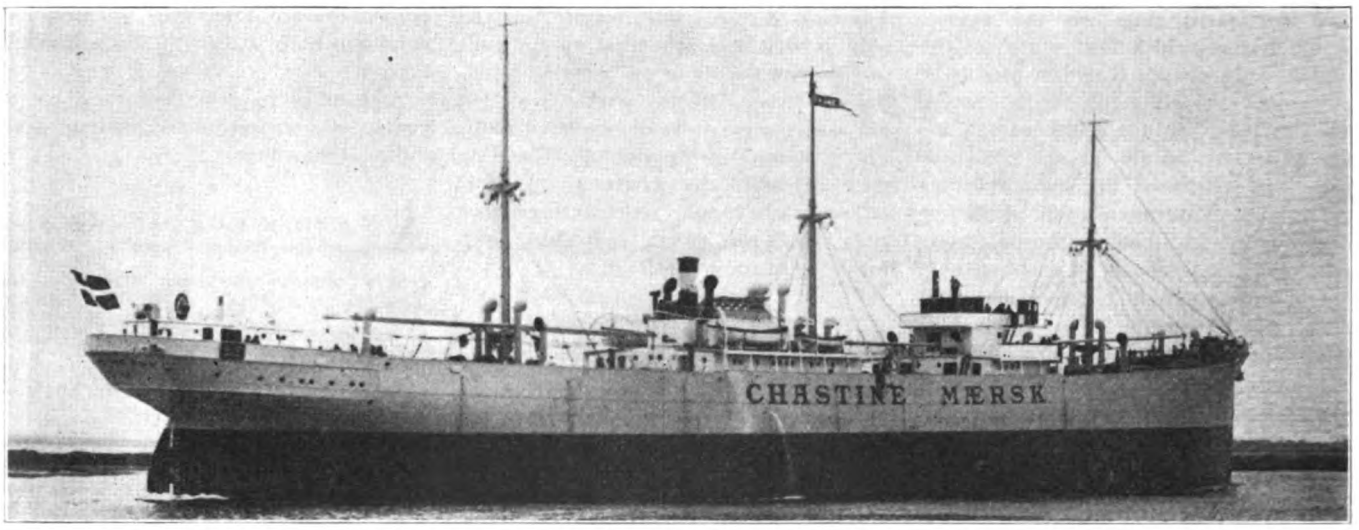
Quay walls Nos. 1, 2, 3, and 12 are fully repaired and can be used. One of the quays has been repaired by army engineers. Two ocean going steamers can be accommodated there. More than a dozen sheds have been restored on land. Lighters and launches are being quickly repaired and will soon be ready in sufficient numbers. Dockers have returned to work.

In another way, America is helping Yokohama to recover its former vitality. Twenty-four relief steamers from the United States, are scheduled to come to Yokohama. The necessity of landing their freights is counted upon to draw government attention more to the port, to speed up repair work and to attract people back to the former great port.

Lake Michigan Receipts

In October, 2,024,835 gross tons of iron ore were received at Lake Michigan ports compared with receipts of 1,231,180 gross tons in the corresponding month of last year. Total receipts up to Nov. 1 are 11,117,142 gross tons. Receipts by ports in October were:

Port	Gross tons
South Chicago, Ill.	1,114,591
East Jordan, Mich.	10,346
Boyne City, Mich.	.....
Milwaukee	.....
Indiana Harbor, Ind.	286,180
Gary, Ind.	613,718
Total	2,024,835



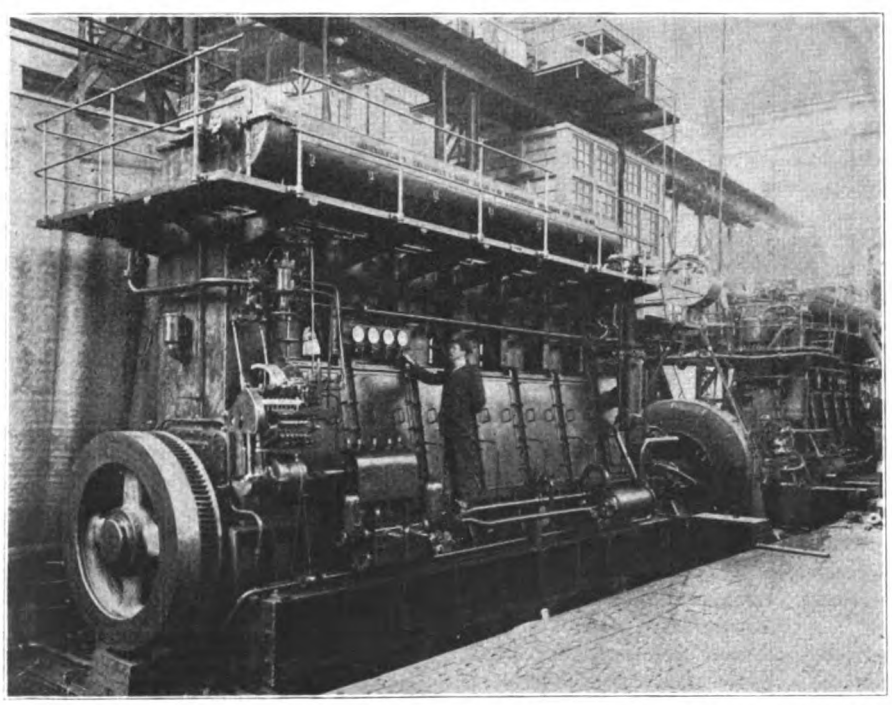
Chastine motorship of 8000 tons deadweight capacity, built and engined in Denmark

New Twin Screw Danish Motorship

CHASTINE MAERSK, a motorship, has been built for the Svendborg Steamship Co., Ltd., Svendborg, Denmark, one of the shipping companies controlled by the well known Danish shipowner, A. P. Moller. The hull was built and the machinery installed by the Odense, Denmark, shipyard, and the machinery supplied by Burmeister & Wain, Ltd., Copenhagen.

The vessel is a 7980-ton twin-screw craft, propelled by two 1100 indicated horsepower Burmeister & Wain diesel engines operating at 150 revolutions per minute. Her principal dimensions and other particulars are as follows:

Length between p. p., ft, in..	378 2
Breadth, molded, ft., in.....	50 0
Depth to shelterdeck, ft., in....	34 5
Depth to upper deck, ft., in....	26 5
Deadweight capacity, tons.....7980	
Register gross tonnage 5176.58	
Register net tonnage 3198.79	
Capacities of holds for grain, cubic feet 422,350	
Capacities of holds for bales, cubic feet 381,650	
Total capacity of fuel oil, tons..1036.50	
Total capacity of water ballast, tons 1284.75	
Spare tanks for fuel oil, tons.. 83	



TWO DIESEL ENGINES OF 1100 INDICATED HORSEPOWER EACH DRIVE THE CHASTINE MAERSK AT 10.5 KNOTS

In the engine room are also two single-cylinder and one 2-cylinder Burmeister & Wain auxiliary diesel engines direct-connected to generators.

All the engine room and deck machinery are electrically driven, the necessary current being supplied by two 33 kilowatt and one 66 kilowatt diesel dynamos. The voltage of the current is 220 and for lighting purpose it is transformed down to 110 volts by means of a motor generator.

Each of the small generators is sufficient for supplying the necessary current under normal working conditions at sea.

Ten 3-ton winches, supplied by Thomas B. Thrige, Odense, Denmark, are used. An electrically driven windlass and Brown's hydroelectric steering gear are installed.

Heating is done by steam from a small cross tube boiler of about 60 square feet heating surface, this boiler also being able to supply steam for extinguishing fire in the holds.

The results from the recent trial trip were:

Draft, aver., ft., in.....	8 8½
Displacement, tons 3400	
Indicated h. p. aver.....2076	
Rev. per min., aver.	160.6
Speed, aver. knots.....	10.58

During the consumption test, the main engines developed 2078 indicated horsepower at 160.5 revolutions per minute at a fuel oil consumption of 127.76 grammes or 0.281 pounds per indicated horsepower hour, including the consumption of the auxiliary engines producing the necessary electric current for the auxiliary machinery, steering engine and electric light.

Editorial

Should Improve Engineering Practice

ENGINEERING practice as applied to operation, has not received the same serious attention in the machinery plants on board ship as in industrial plants ashore. An executive responsible for the efficient operation of a steam plant ashore would not for a single moment consider detailing the supervision of such a plant to a man merely because he had learned by years of experience how to fire a boiler and to keep water in it.

To begin with, one must admit that the conditions surrounding the operation of a large, properly conducted steam plant ashore where the supervising engineer is in daily contact with his plant, are quite different from those surrounding the operation of a fleet of steamships with one or two in port and the remaining units anywhere on the high seas far removed from the eye of the supervising engineer. Because the problem is more difficult, however, does not excuse neglect properly to apply, as far as possible, the same sort of good engineering practice as is done ashore. Though the units of a steamship supervising engineer's steam plant are not under his immediate eye and may be widely separated all over the seven seas, he has one advantage over a man in a similar position ashore. Each chief engineer of a ship is, or can be and should be in a true sense, the deputy with full qualifications for carrying on his job with similar engineering sense to that of his chief. On account of the greater responsibility, the qualifications necessary, and the correspondingly greater compensation, the operating or chief engineer of a ship is generally a more capable man than the operating engineer of a stationary steam plant of the same size.

The difficulties then which face the thoroughly versed engineer in applying correct principles to efficient operation of his individual steam plant units, the ships under his charge, aside from that one greatest difficulty of all, the lack of conviction on the part of the owner that such application will save costs and from which most of the others naturally spring, is the nature of the business associated with his steam plants. Their reason for existence is to provide power so that the ships in which they are installed may move expeditiously about their business of loading, carrying and discharging cargoes.

To stop a ship to determine her steaming efficiency when she is about ready to proceed, would be just as ridiculous as to stop an athlete to examine the condition of his heart when the crack of the pistol is heard which is to send him on his race with his competitors. But not to look into the efficiency of the power plant at all at any time is just as reckless management as it would be not to examine an athlete's heart at all before he enters a long and gruelling contest.

For a busy ship which must be on the move to make money, what then would be a suitable time to carefully determine her operating efficiency? It must be clearly understood that no suitable time is ever found nor will it be found until the owners realize that at proper intervals it is quite as important to make such an examination (perhaps not oftener than once every year or two) as it is to take the time necessary to drydock the ship or to hold her up for essential repairs.

A complete evaporative test of 24 hours duration, conducted once a year or once in two years with full and accurate records made and tabulated, would most certainly indicate ways of improving the efficiency and would be extremely valuable in giving exact knowledge of steaming efficiency or cost of operation and whether changes to improve conditions should be made or the ship withdrawn in favor of a more efficient unit. Such a test would also set a standard by which the performance of the operating engineers could be intelligently and accurately judged. By such a test, out of each pound of fuel used the amount of heat absorbed by the boilers, also the amounts of heat lost, by imperfect combustion, in chimney gases, and from other causes, would be determined. The ratio, therefore, between the heat per unit of fuel burned, absorbed by the boiler and the total heat per unit of fuel would give the boiler and furnace efficiency in per cent. The amount of steam consumed by the main engine or engines and all of the auxiliaries could also be measured, thus determining the efficiency of these units based on power furnished.

In addition, though somewhat apart from the present discussion, a careful investigation should be made once for all of the resistance of the hull of the ship in relation to the displacement and designed speed, and find out if the propeller or propellers are of the best shape, dimensions, and are suitable for the hull, to give maximum results with a minimum of power.

The immediately foregoing has to do with the proper design of the ship and with careful owners is presumably well taken care of in the designs leading up to the construction of the ship. In acquiring an existing ship, however, it would be worth while for the prospective owners to investigate these matters carefully through properly qualified representatives. Such information with particulars of the machinery and power plant, definitely set the limit of ultimate efficiency possible.

Practical Ideas for the Engineer

New Rudder of Flow-Operated Type—Valve Actuated by Sun—Nesting Lifeboats

RUDDER design has been left practically untouched by marine engineers. The modern liner, in principle, is fitted with the same sort of rudder which thousands of years ago, steered the barges of primitive navigators. It is, therefore, of particular interest to note a radical change in the design and method of actuating rudders. This method and design is the invention of Anton Flettner of Berlin, and is known as the "flow-operated" rudder.

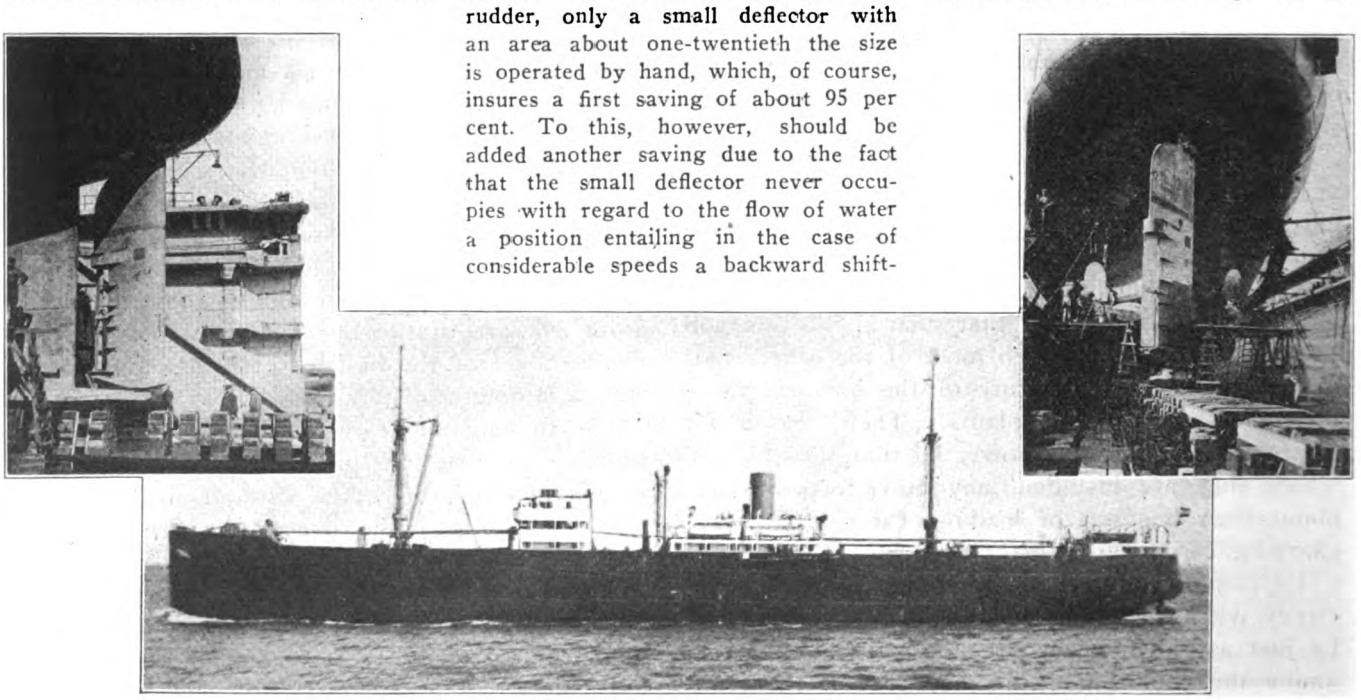
The ordinary rudder, of course, depends upon the flow of water against it to produce the pressure which in turn imparts to the vessel the deflection desired. Flettner, however, has gone one step farther and derives from the same flow the force required to deflect the rudder itself, dispensing with any rudder engine and thus saving the considerable amount of energy required for its operation, at the same time increasing the safety as well as the ease of steering.

The effect of an ordinary rudder as above referred to, is due to the pressure produced on setting the helm, which, in turn, is the difference between the increase in pressure on the side turned toward the flow and the reduction of pressure on the opposite side, which is several times as much. This effect can be described as a conversion of pressure into velocity and as shown by recent experimental research, is most favorable within certain angles of deflection. In fact, a certain range of angles should never be exceeded in setting the rudder. If this range be exceeded, a sudden falling off in the rudder effect is noted.

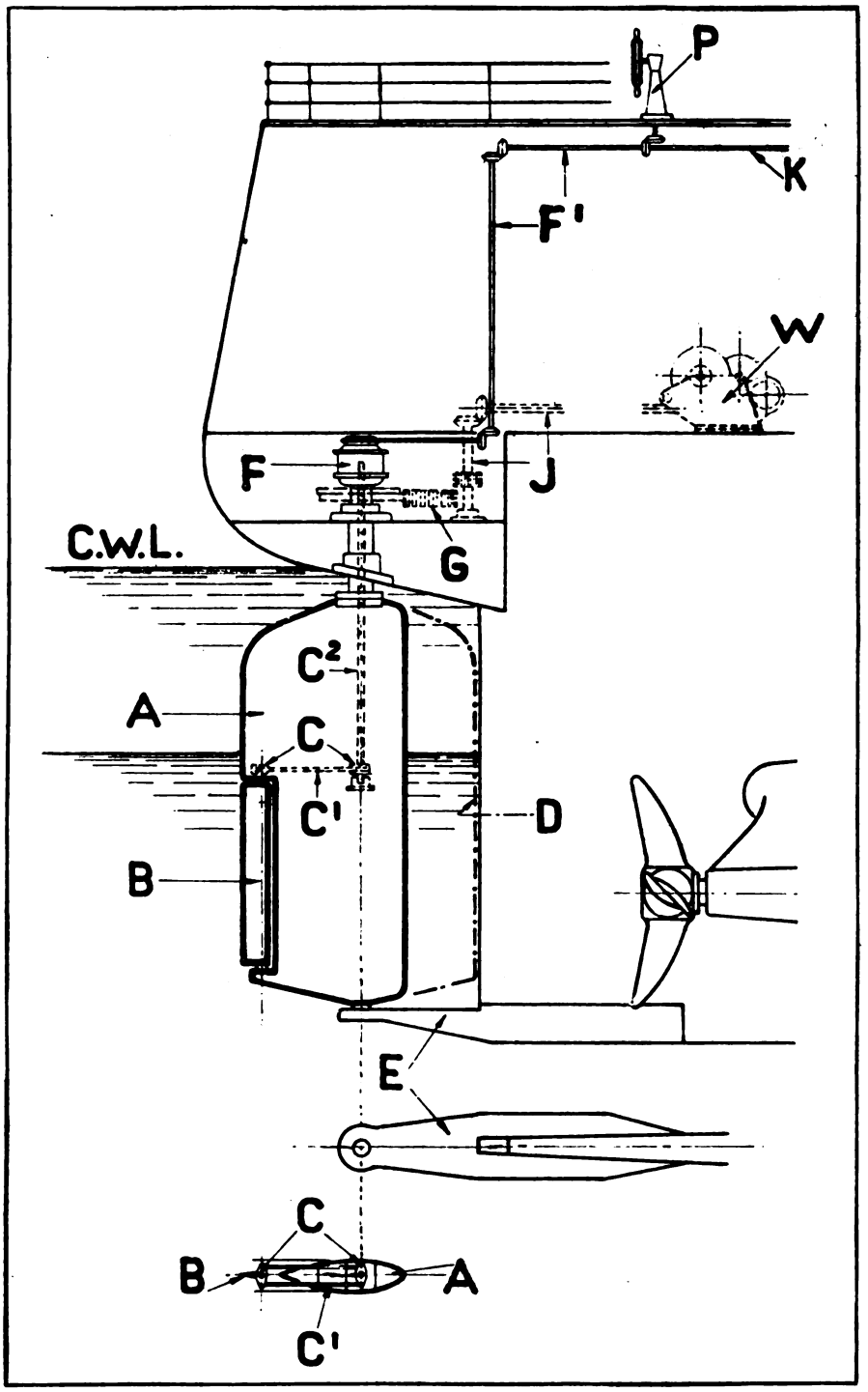
Now, the principle underlying the construction of the Flettner rudder consists of setting up at the rear edge of the rudder a pressure difference opposite in direction. The rudder is not maintained in position by a steering engine, according to the usual practice, but is arranged so that it is free to turn through the complete arc of circle around its axis, or points of support. A small section near the rear edge, designed as an auxiliary rudder or deflector, provides the pressure difference required to deflect the main rudder. The mode of operation will best be understood by regarding it as the result of a considerable force acting on a short lever arm, which is balanced by a much smaller pressure acting on a long lever arm.

The deflector, even in the case of large vessels, is actuated by hand, a cable from the steering wheel leads to a self-locking toothed gear enclosed in a case. The great saving of energy secured by the use of the deflector is shown by the following considerations: Instead of a big main rudder, only a small deflector with an area about one-twentieth the size is operated by hand, which, of course, insures a first saving of about 95 per cent. To this, however, should be added another saving due to the fact that the small deflector never occupies with regard to the flow of water a position entailing in the case of considerable speeds a backward shifting of the center of pressure. This center, in the standard type of rudder in use, is known to be displaced as far as about the center of the rudder when the latter is put at a right angle, so that the rudder engine has to stand a high strain. Such exceptional duties are never expected from the deflector arrangement. In fact, the amount of energy required to effect the deflection may safely be estimated at a fraction of 5 per cent, and is likely to be on an average, about 2 to 3 per cent, the saving of energy thus being 97-98 per cent.

The Flettner rudder was fitted on the refrigerating steamer FRIGIDO of Messrs. Wm. H. Muller & Co. at the Wilton Engineering Works and Shipyards, at Rotterdam. This ship has been operating continually on the London-Rotterdam and London-Antwerp service since the spring of 1921. The new rudder has done excellent service both in the busy range of the river Thames and during heavy winter storms on the North sea. Special trial trips under particularly hard conditions likewise gave remarkably satisfactory results. No trouble has been experienced in the operation of her rudder either in maneuvering or while sailing. The very fact that the rudder is automatically directed according to the flow of water was found greatly to increase the ease of steering. Another



FLOW-OPERATED RUDDER INSTALLED ON REFRIGERATING STEAMER FRIGIDO



HOW NEW RUDDER IS FITTED, THE VIEW SHOWING CLEARLY METHOD OF OPERATION

feature of the new rudder, which has been brought out in actual practice, is the remarkable steadiness of the steering effort exerted on the ship. In fact, apart from the practically instantaneous setting of the rudder, such fluctuations as are otherwise produced by variations in flow are here entirely done away with, the rudder being perfectly free from any rigid connection with the vessel and, accordingly, responding instantaneously, like a spring, to any deflecting force, in order immediately to return into the position assigned to it by the deflector. It is interesting to note how in bad weather, in a rough sea, etc., the index of the main rudder gage continually moves to and fro slightly, while the ship keeps the steadiness of her course unaltered and steering is reduced to a minimum. The fact that the main rudder axis does not transmit any twisting effects obviously adds to the safety of the scheme. The absence of any rudder engine, of course, means a reduction in first cost, operating expenses, repairs, superintendence and upkeep.

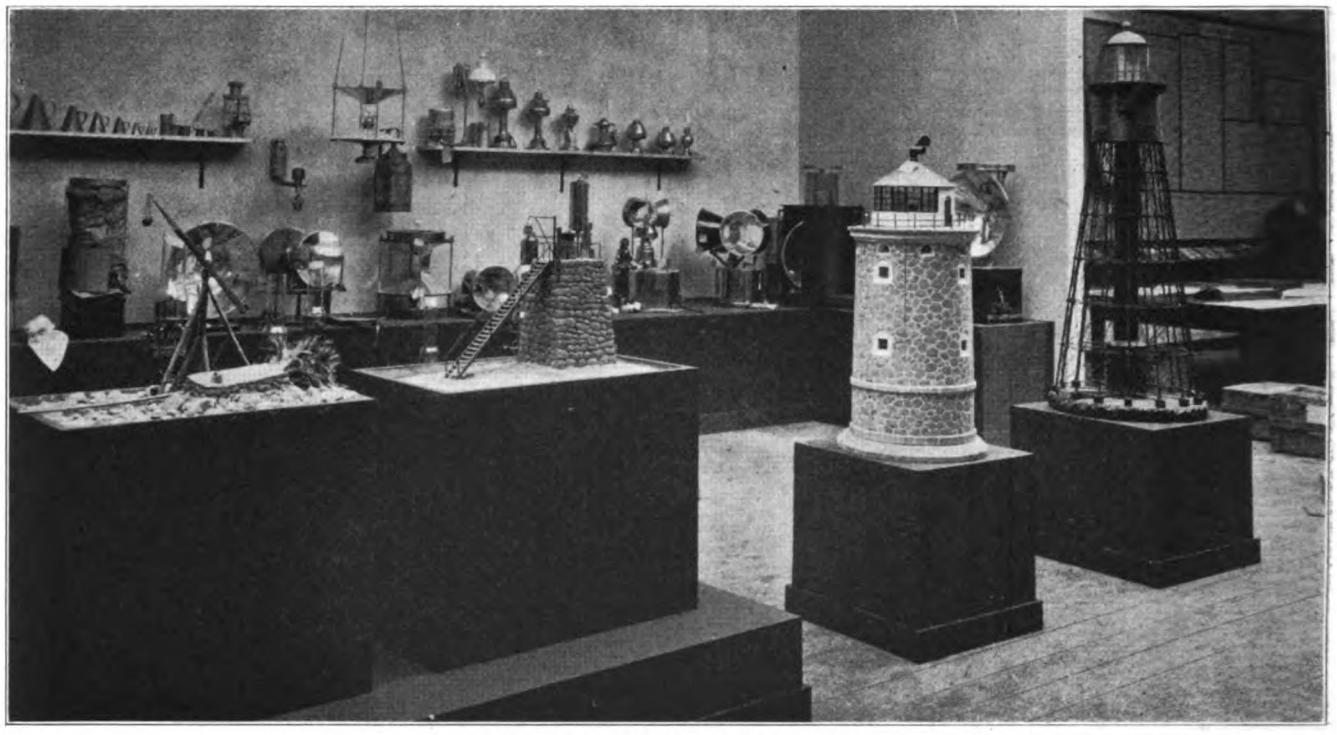
The development of modern warships shows the necessity of increasing the ease of steering, especially with a view to affording protection against attacks by submarines. Several rudders of the usual design had, therefore, to be provided, each of which was hardly substantial enough to stand the considerable pressures corresponding to the high speeds. The new scheme will enable a single rudder of excessive dimensions to be provided, which, while being much more efficient than a standard rudder, has to comply with much smaller requirements with regard to the strength of its design. A warship thus equipped obviously possesses superiority in maneuvering.

The excellent results given by the first rudder of this type induced the Hamburg-American line of Hamburg, to equip the twin-screw motorship ODENWALD of 8000 tons as well as a 9300-ton freight ship now in course of building, with Flettner rudders. Trial trips made with the former have given as much satisfaction as in the case of the FRIGIDO.

Sun Valve Acts in Place of Lighthouse Keeper

In the accompanying photograph, models of beacons and lighthouses using the "Aga" type of lights are shown. Lights of this type are now in use along the American coasts and at the Panama canal. They have the magic quality of lighting up automatically at nightfall or in the case of a heavy fog, and of extinguishing themselves at the return of daylight. These lights operate by means of acetylene gas stored in tanks, and the automatic control is effected by the use of an interesting sun valve invented by Gustaf Dalen of Sweden. This type of light is manufactured in America by the Gasaccumulator Co., Newark, N. J.

The sun valve is actuated by light and is not influenced by changes in temperature. Its operation is based on the well known physical law that absorbed light is transformed into heat. Four metal rods protected by a strong glass cylinder form the basis of the system. The central rod is coated with lamp black which gives it the property of absorbing light, while the three rods surrounding it are polished, thus reflecting the light. Consequently all four rods expand the same amount under the influence of heat, but only the central rod expands under the influence of light. The expansion or lengthening of the central rod caused by heat due to absorbed light serves to operate a valve which controls the



MODELS OF "AGA" BEACONS AND LIGHTHOUSES

Invented by "the blind Edison of Sweden," Gustaf Dalen, who gave his eyes that others might see. He was blinded by an explosion during his experiments. He is head of the Gasaccumulator Co., Lidingon, Sweden, and Newark, N. J. The "Aga" lights are now used along the American coasts and also in the Panama canal. They are being adapted as road signals in this country and may also be used for the new transcontinental flying routes. They have the magic quality of lighting up automatically at nightfall or in the case of a heavy fog and extinguishing themselves at the return of daylight. This is effected through the sun valve, invented by Mr. Dalen

passage of gas in a branch pipe between the mixer and a valve in the main pipe to the burner, controlling in turn the gas supply to the latter. At the approach of daylight, the black rod expands and closes the valve, and at the approach of darkness it contracts, opening the valve.

A pilot light is maintained during the day, while the sun valve is closed, fed by a small flow of gas conveyed through a bypass which starts from the pump chamber and ends in the main supply pipe to the burner. As soon as the sun valve opens, a small flow of gas will pass from the pump chamber to the outlet where it operates the main valve, immediately allowing the gas to pass to the burner. Since the sun valve cannot be arranged with the sort of bypass which would be required if it were inserted in the main supply pipe to the burner, it is necessary to have this valve control the supply to the burner indirectly by means of the gas flow in a separate branch pipe.

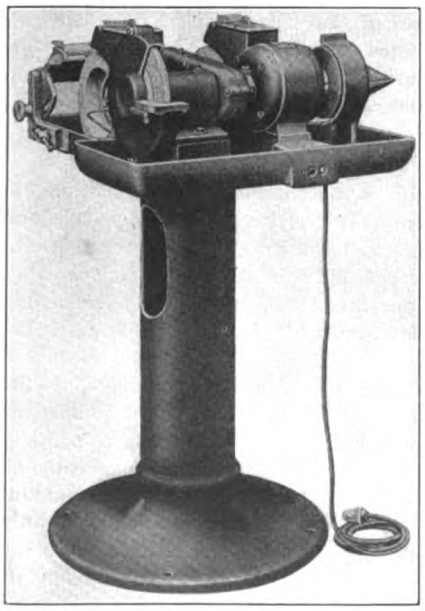


FIG. 1—SELF-CONTAINED GRINDER EQUIPPED WITH FOUR WHEELS

It is computed that an average saving in gas of 40 per cent per year is obtained by using the sun valve. The manufacturers, however, in order to be fully on the safe side, calculate a saving of only 30 per cent as an average for different seasons. The saving depends to a certain extent on the climate. For instance, it is greater in places having a great deal of clear weather and bright skies, and less where the weather is misty or foggy. A greater saving is also possible, of course, in summer than in winter except at or near the equator. The length of time which the light will burn without attention depends upon the number and the size of the gas tanks. For example, a buoy or beacon may be arranged to burn for six months or for one or two years without attention. In one particular lighthouse, 45 tanks are arranged to supply the gas.

Oilstone Grinder

Oilstone grinders are said to show high efficiency in sharpening woodworking tools as they produce keen cutting edges without danger of drawing the temper. The accompanying illustrations show an oilstone grinder recently developed by the Oliver Machinery Co., Grand Rapids, Mich. Fig. 1 is a front view and Fig. 2 a plan.

The machine is equipped with two oilstone wheels, a cone wheel and a regular grinding wheel. The oilstone wheels are kept saturated with kerosene or other

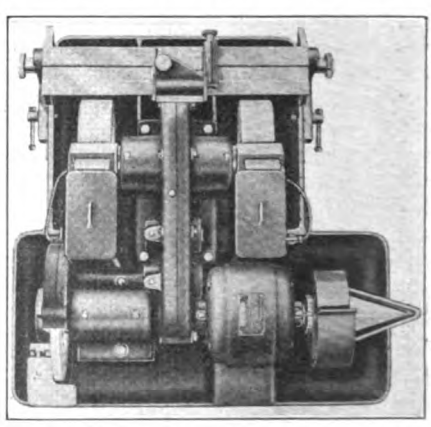


FIG. 2—PLAN VIEW SHOWING THE ARRANGEMENT OF THE FOUR WHEELS

lubricant which flows by capillary attraction and centrifugal force from the center to the periphery. These wheels are equipped with guards, although they operate at comparatively slow speed. They are located back of a table that serves as a tool rest. This is provided with a sliding tool holder which is equipped with a micrometer feed for the accurate finishing of plane bits, chisels and similar tools.

The cone wheel and also a leather stropping wheel are mounted directly on the motor shaft. The cone is useful for finishing the inside of curved edge tools, etc. The stropping wheel removes burrs and imparts a keen edge. The other end of the motor shaft accommodates a general utility grinding wheel. The machine is arranged so that four men can grind simultaneously.

Lake Erie Receipts

Ports on Lake Erie received 6,290,491 gross tons of iron ore in October compared with 6,792,847 tons in September and 4,764,588 tons in October of last year. Total receipts up to Nov. 1 are 40,416,982 gross tons. Details are:

Port	Gross tons
Buffalo and Port Colborne	629,519
Erie	177,085
Conneaut	1,414,584
Ashtabula	1,565,783
Fairport	320,317
Cleveland	1,203,209
Lorain	547,156
Huron	167,976
Toledo	153,738
Detroit	111,124
Total	6,290,491

Nesting Lifeboat of a New Type

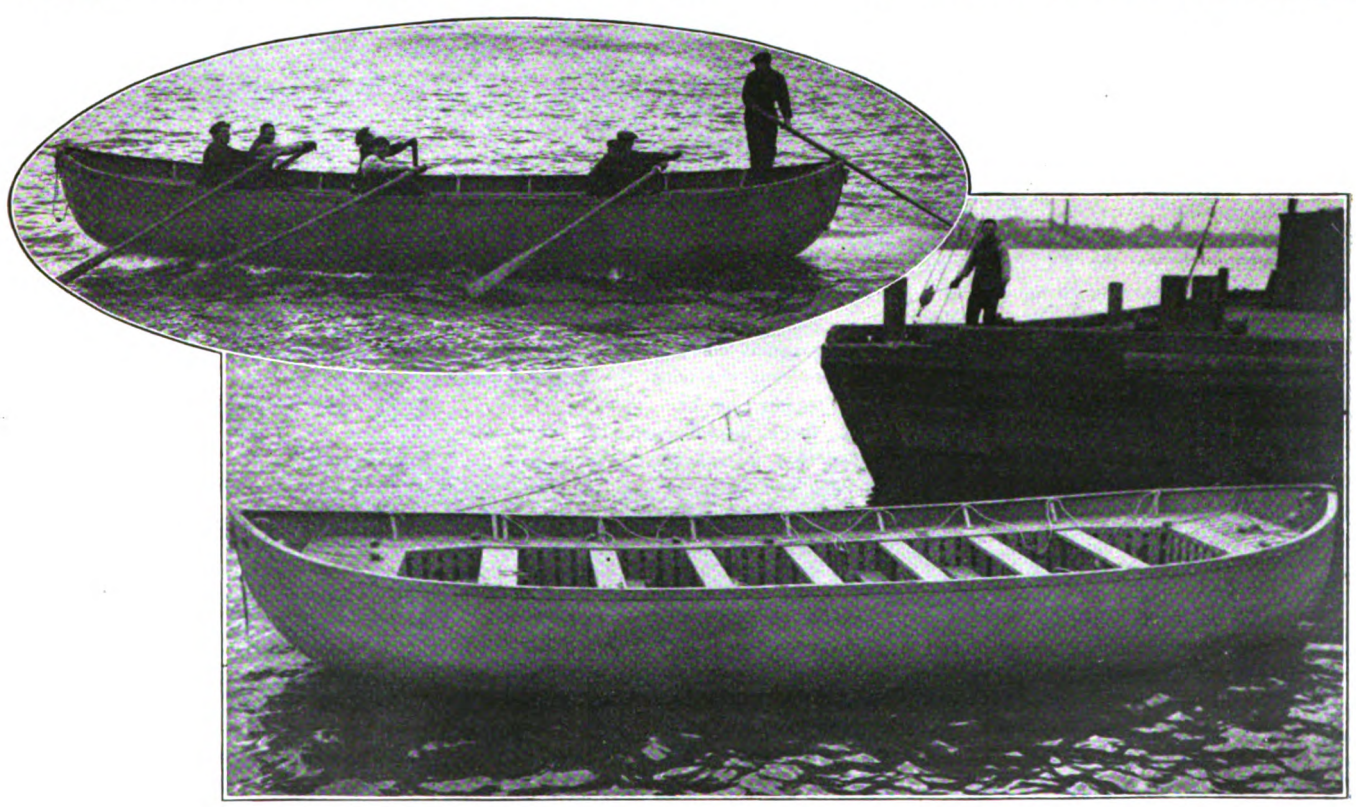
In order to accommodate the full number of persons on board of passenger ships, it is often necessary to nest lifeboats one on top of another due to the fact that the deck space is not sufficient to accommodate the required number. The Welin Davit & Boat Corp., 305 Vernon avenue, Long Island City, N. Y., has for years constructed lifeboats of different types that could be nested. The latest type of this character is shown in the accompanying photographs. Actually, it is more on the lines of a regular, full-bodied steel lifeboat than any previous nesting boat. By holding the keel line practically parallel to the sheer line, one of these boats will stow over another boat in a minimum of height and due to the rise of the keel at the ends will lie much closer to the under boat. This will also simplify chocking and will reduce the lifting of the boat to a minimum before launching with the davits.

This boat is built of galvanized sheet steel with a flat outer keel, with two angle iron keelsons and an apron plate between the keel and the keelson to which the shell plating is riveted. The bottom shell is strengthened and stiffened by floors, flanged to the shell plating, worked over the keelsons from bilge to bilge. The tops of the floors are also flanged to take the wooden footlings. This will give a straight walking floor in the bottom of the boat and allow ample space between the shell and footlings to prevent the bad effect of wooden footlings in direct contact with the steel shell of the boat.

Another new and interesting feature about the construction of this boat is the gunwales which are of angle iron. These gunwales increase the strength and rigidity of the boat. They also tend to keep the shell in contact with the gunwales from the deterioration which quickly sets up with oak gunwales. The vertical leg of the angle is worked on the outside of the shell plate and riveted to the plate, consequently making a perfectly watertight joint and not giving an opportunity for moisture to start corrosion. This boat has been so materially strengthened by use of flanged floors and angle iron gunwales that in suspension tests in loaded condition the keel deflection is so slight that it can not be measured. This is the type of boat which was adopted for life boat accommodations in reconditioning the LEVIATHAN.

FRANK C. MUNSON, president of the Munson Steamship line and John McAuliffe, traffic manager of Norton, Lilly & Co., New York, will be the speakers before the Traffic Club of New England at a special steamship night to be held at the Copley-Plaza hotel, Boston, on Nov. 20.

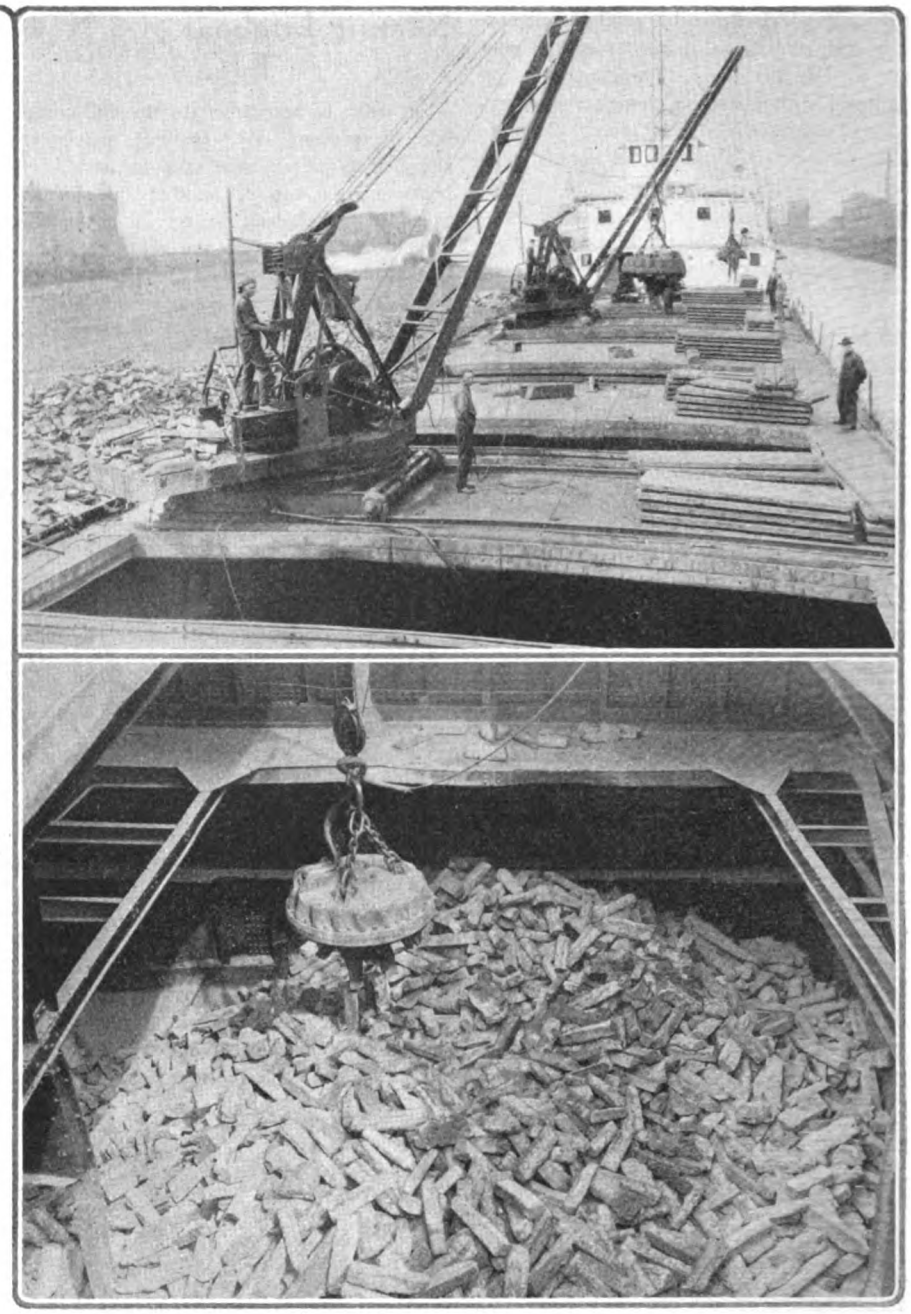
The Boston & Gloucester Steamboat Co., has bought the steamer MASCOTTE for service between Boston and Gloucester.



NEW NESTING LIFEBOAT ADOPTED FOR USE ON THE LEVIATHAN

Pig Iron Cargo Handled on Ship with Magnets

Locomotive Type Cranes Carried on Deck, Load and Unload Lake Steamer Independent of Land Equipment



THE CARGO CAPACITY OF THE GRIFFIN IS 3000 TONS, AND THE BOAT HAS BEEN LOADED BY MEANS OF THE TWO LOCOMOTIVE TYPE CRANES, EQUIPPED WITH LIFTING MAGNETS, IN 50 HOURS

A NOVEL method of handling pig iron is being tried out on the Great Lakes, and is demonstrating practical points of economy and efficiency. The loading and unloading of railroad cars by means of lifting magnets on stationary or movable crane has long been customary in iron and steel plants, and some ship cargo also has been handled in this way, with equipment located on docks. For a vessel to carry its own crane and magnets, however, and for the special purpose of placing pig iron in its hold or removing it to the dock, independent of any other equipment, represents a unique departure from usual practice.

This is being done by the Charcoal Iron Co. of America, which has plants at Ashland, Wis., and at Manistique, Newberry and Boyne City, Mich. The company ships a considerable portion of its product by vessel to Buffalo for eastern distribution. It has one vessel in this service, the GRIFFIN, originally built for carrying iron ore and grain, and which it acquired in 1918. The GRIFFIN is 270 feet over all, its beam is 40 feet, and depth 24 feet; the cargo capacity is 3000 tons. The GRIFFIN carries cargoes of pig iron from the company's Michigan and Wisconsin plants and unloads them at the Buffalo docks of the Lehigh Valley railroad. On return trips the boat usually has a cargo of coal for consignment to ports on the west shore of Lake Michigan, or on Lake Superior.

Previous to the acquisition of the GRIFFIN, the Charcoal Iron company operated the steamer CICOA for the same kind of service. The CICOA was taken over by the government during the war and put into coast service on the Atlantic. The CICOA was equipped with lifting magnets in 1916, but this equipment was removed when the steamer was put in ocean service.

The brief experience with this ship showed that it was feasible and economical to load cargoes of pig iron by magnet cranes mounted on deck, so when the Charcoal Iron company resumed pig iron shipments during 1923, the first step was to equip the GRIFFIN with magnets in the same way that the CICOA was equipped, except that the cranes and magnets are larger to allow for faster loading and unloading.

The equipment consists of two 45-inch, 220-volt, Cutler-Hammer Mfg. Co., lifting magnets and two Orton & Steinbrenner Co. steam locomotive-type cranes with 36-foot booms. Steam pressure is supplied from the ship's boilers. The cranes have special channel iron bases and rest on rails bolted to the deck. The cranes may be rolled from one side of the deck to the other. While in operation or while the ship is moving, they are securely fastened to the deck by special rail clamps. Current for the magnets is supplied from an engine generator set in the engine room. This set was added to the ship's equipment when the magnets were installed.

The GRIFFIN has seven hatches. One crane is located between hatches 1 and 3, and the other between hatches 5 and 6. The operating area of the cranes covers the entire portion of the hold directly

below the hatches. There is a small area between the hatches which cannot be reached by the magnets, but the amount of pig iron which spills over into this area is relatively small, and can be moved by hand in a short time after the bulk of the cargo has been unloaded.

The magnets were installed under the direction of J. H. Gallagher, captain of the GRIFFIN. Captain Gallagher says a crew of 40 longshoremen would be required to do the work of the two magnet cranes.

Loading Time Is Shorter

The time of loading is somewhat shorter than unloading, because the deck is approximately at the same level as the piles of pig iron on the dock, and little time is required for the hoist motion. On the other hand, when unloading, the time required to hoist from the hold is a very appreciable part of the cycle. When unloading, the cranes will make one trip in about 90 seconds. The GRIFFIN has been loaded to capacity in 50 hours, and about 75 hours is required to unload.

The 45-inch magnets will lift nearly a ton of machine-cast pig iron, and about 1000 or 1500 pounds of sand-cast iron, depending upon the size of the pigs and the analysis of the metal. Each magnet weighs 3730 pounds, net, and requires approximately 35 amperes for excitation.

For a long time cargoes were loaded by hand labor. The company believed it could save the entire investment in magnet crane equipment in one year; and this expectation is said to have been fulfilled. With a crew of 40 longshoremen, the cost of loading a cargo of 3000 tons would not be less than $2000 and the cost of unloading by hand would be as much more. Assuming the vessel makes seven trips a season, it would cost in the neighborhood of $28,000 for hand loading. As close as can be estimated, this amount is sufficient to cover the total investment in cranes and magnets; the steam consumption for operating the cranes, and the wages of the deck hands. There are only two men on each crane while unloading.

Rogers, Brown & Co., Buffalo, recently contracted for the GRIFFIN to carry a cargo of pig iron from Buffalo to a dock at Milwaukee. About two days after the cargo was unloaded, the swampy ground on which the pig iron rested gave way under the burden and slid into the river channel, pushing the dock timbers ahead of it. About 1200 tons was under water, some of it very near the surface, but several hundred tons out in the channel. The iron was recovered according to practice followed at the docks of the Charcoal Iron company. Shipmasters may be interested to learn in what way the ship's compass is affected when a ship is carrying a cargo of iron loaded by magnets. Captain Gallagher says the compass will be deflected about two points, and that this deflection is compensated by adjusting the magnets provided on the binnacle for this purpose. The position of the compass is checked in the regular way by azimuth readings. There is a tendency for the magnetization of the cargo to vary when the ship is in motion. The change in magnetization is gradual, and not abrupt. For this reason, it is standard practice to check the compass at regular intervals when carrying a cargo of iron. This action on the compass offers no real impediment to navigation but does require somewhat more than usual vigilance.

Call Second U. S.-Mexico Trade Conference

The second United States-Mexico trade conference has been called at Mexico City for Feb. 11-15, 1924. The conference is backed by the American Chamber of Commerce of Mexico which called the first meeting in February, 1920. That conference was well attended. The growing trade which has made Mexico this country's second best Latin-American customer inspired this new conference to discuss business problems.

Capt. James Buchanan, Lakewood, O., master of the steamer LUZON died Oct. 12. He had suffered a stroke after his vessel went ashore six days earlier.

TWO 45-INCH LIFTING MAGNETS UNLOADING PIG IRON FROM STEAMER GRIFFIN, OWNED BY CHARCOAL IRON CO. OF AMERICA

Marine Week Arouses National Interest

(*Continued from Page* 456)

try was touched upon, as an offset to the depression at present existing in vessels for the foreign trade. Economy in production of power was pointed out as of the greatest importance and how the industrial and power plants ashore realized this and have carried out steps to improve economy, by means of using higher steam pressures and superheat. It was pointed out that these industrial plants neglect no detail which will contribute to greater economy. In a similar manner, it is expected that the experience gained ashore will favorably influence the design and operation of machinery for vessels.

The technical papers presented were listed in these columns last month. That on diesel engine development by Robert Haig is given in full in this issue.

Altogether, it may be safely stated that the Marine week of 1923, has been of great benefit in stirring up interest in the merchant marine, and that correspondingly great benefits will accrue to the industry. The resolutions approved by the Marine congress are:

Resolutions of Marine Congress

RESOLUTION No. 1

Part A. Resolved that the United States shipping board and Emergency Fleet corporation should retire from the business of operating ships, and place the operation in private hands, at the earliest practicable date.

Part B. Resolved that the United States shipping board should immediately scrap such vessels as are inferior in design, equipment or condition.

Part C. Resolved that the shipping board should offer its remaining vessels for sale to American citizens without any restrictions, and without discrimination between buyers and ports.

Part D. Resolved that after the lapse of a reasonable time all of the vessels not sold under the foregoing plan and having no immediate prospective sale value, should be scrapped.

Part E. Resolved that there are some freight and passenger and mail services maintained by shipping board vessels, the continuance of which may be considered as essential to our national interests. If the shipping board is unable to find buyers for the vessels in such services, they should be placed in private hands under an operating arrangement until buyers can be found or developed or the impossibility of profitable operation be definitely established.

RESOLUTION No. 2

Resolved that American shipping should be conducted by private American owners and that all merchant ships owned by the government should be transferred as rapidly as possible to private ownership. Under no condition should government-owned lines compete with private lines but, if for the purpose of expanding our trade, new lines are established by the government, they should be as rapidly as possible transferred to private ownership.

RESOLUTION No. 3

Resolved that the secretary of commerce and the U. S. shipping board be requested to proceed to have the navigation laws of the United States modernized, codified and made comparable with those of our successful maritime competitors.

RESOLUTION No. 4

Resolved that the unparalleled success which has attended the reserving to American ships of first our own mainland commerce and that of our commerce with Alaska, Porto Rico and Hawaii, justifies and demands the prompt extension of that national policy to our own commerce with the Philippines.

RESOLUTION No. 5

Resolved that we urge the adoption of a national policy reserving the transportation of not less than one-half of the total number of immigrants admitted to the United States in any fiscal year to vessels registered or enrolled and licensed under the laws of the United States.

RESOLUTION No. 6

Resolved that we favor the enrollment under suitable regulations as to pay, qualifications and duties of officers and men of the merchant marine in the naval reserve of the United States.

RESOLUTION No. 7

Resolved that we favor the carriage of governmental officials and employes and supplies by privately-owned American ships, and the restriction of ocean travel by government officials and employes to American ships when available.

RESOLUTION No. 8

Resolved that we heartily approve the enlightened policy of the post office department under the merchant marine act of 1920, and that we strongly urge the department to continue to transmit the mails by American steamers whenever this can be accomplished with the least possible delay.

RESOLUTION No. 9

Resolved that the rail and ocean transportation media be drawn together and made to function as one transportation system to all parts of the world; and be it further

Resolved that permission be given to railroads and American steamship lines to enter into co-operative agreements to divide their said joint rates in a manner similar to that universally pursued in the division of rates on domestic and traffic via Canada; and be it further

Resolved that such arrangement shall not be permitted with respect to American railroads and foreign steamship lines.

RESOLUTION No. 10

Resolved that an earnest effort be made on the part of the administration to amend existing treaties with a view of the establishment of preferential customs duties on goods carried by American ships and tonnage dues paid by American ships.

RESOLUTION No. 11

Resolved that a system of preferential rail rates for goods and passengers carried in American ships be made effective.

RESOLUTION No. 12

Resolved that we adopt the policy of allowing our railroads to apply export rates on materials used in the construction of American ships and on supplies used therein.

RESOLUTION No. 13

Resolved that it is essential to the permanence of the American merchant marine that American ships be properly built, manned, equipped and operated, and that all equipment and appurtenances be kept at a high state of efficiency and that the cargoes carried be properly loaded, safely carried and delivered; it is recommended that a proper uniform load line law be enacted, and it is further recommended that all American vessels be classified in the American Bureau of Shipping; and that loading of cargo be inspected by the board of underwriters and a loading certificate be obtained in the case of vessels engaged in overseas trade, and that the vessels be insured in the American marine insurance syndicates, and that in the event of any loss or damage the services of these associations be immediately availed of.

RESOLUTION No. 14

Resolved that the national congress repeal all laws that admit foreign-built ships, including yachts, to American registry, and eliminate the 10 per cent excise tax on pleasure boats built in this country.

RESOLUTION No. 15

Resolved that the practice of placing contracts for repairs to government (other than naval) vessels on a basis of estimated cost without guarantee, in competition with bids of private interests, is unfair and should be discontinued.

RESOLUTION No. 16

Resolved that the chairman of the United States shipping board be requested to have prepared and caused to be released as public information a report of the recent survey of its idle or other tonnage suitable for conversion into vessels equipped with oil engines, and to include therein a fairly comprehensive statement of physical condition of such vessels. That the construction loan fund established by the merchant marine act of 1920 be made available for loans for the conversion of suitable government owned steam vessels to motor vessels and for equipping them with such new auxiliaries as this conversion would necessitate. That purchasers entering into agreement for such conversion shall be enabled to borrow, from the fund named in above paragraph, to an amount not exceeding two-thirds of the cost of complete conversion under the same terms and conditions as are now provided for in case of new construction. Such costs of conversion to include shipyard charges for installation and necessary repairs and alterations to hull as well as the costs of main engines and auxiliaries, while the remaining one-third of all such costs are to be borne by the purchasers.

That the government be encouraged to

continue to sell such vessels for such conversion under the most advantageous terms to the purchaser.

RESOLUTION No. 17

Resolved that the congress strongly endorse the movement for elimination of waste and simplification of practice initiated by the United States department of commerce, the American Marine association, the United States Shipping Board Emergency Fleet Corp. and the representatives of the marine industries and the organization by them of the American marine standards committee.

That the American marine standards committee be commended to the interests in the marine field, for their encouragement and support, as a proper organization to point the way to needed economy in the design, construction and operation of ships and port facilities and allied industries, and one which, if properly encouraged and supported, can accomplish much to lessen the economic handicap with which our merchant marine is at present hampered and also to promote the construction of American ships in American shipyards.

RESOLUTION No. 18

Whereas a comparison of area and population of Europe as a whole and the United States discloses that although of similar area and commerce the United States has comparatively few well developed ocean and inland waterway ports while Europe has many, serving every section of its coasts and interior, and

Whereas the inevitable growth of the population and commerce of the United States will require many well equipped ocean gateways, therefore

BE IT RESOLVED that it is the consensus of opinion of the American Marine congress that the development of an adequate number of ports be encouraged and that to that end equitable ocean and rail class and commodity rates for exports, imports, coastwise and intercoastal trade to and from such ports on an equitable basis be established and maintained.

RESOLUTION No. 19

Resolved that all bureaus of the department of commerce having to do with merchant marine affairs be consolidated under one head within the department of commerce.

RESOLUTION No. 20

Resolved that American citizens who travel abroad for business or pleasure, individually and collectively, including business and professional associations taking part in foreign conventions, athletic teams, merchants and manufacturers who ship to and receive goods from foreign countries and all other American citizens who travel and ship by sea should consider themselves bound by patriotic duty to patronize American ships.

RESOLUTION No. 21

Resolved that in view of the fact that liquor smugglers can readily transfer their present registry from the British to the French or Panaman or other foreign flags, and in view of the fact that most liquor smugglers at the present time are accustomed to anchor more than 12 miles off shore, and in view of the fact that the proposed treaty with Great Britain will give British passenger ships an advantage over all other ships including American, we earnestly urge the senate of the United States, in the interests of fair play to American shipping, to reject the proposed 12-mile treaty with the British government.

RESOLUTION No. 22

Whereas undoubtedly the American Marine congress is especially interested in all matters pertaining to shipping, and therefore is vitally concerned with our export trade which makes such shipping possible, they have therefore a vital point of contact with all other organizations interested in promoting foreign trade, and should co-operate to the fullest extent with these associations and with the proper governmental departments. We appreciate the force of public thought that may be created at such meetings as this, and the influence that discussions at the sessions and the resolutions that may be adopted by the resolutions committee play in the affairs of the nation. Much good can be done in co-operating with the various associations that have made this congress possible and can assure you that this committee, having been appointed by the American Manufacturers' Export association, will do all in its power to bring to the attention of that association any resolutions adopted by your resolutions committee for such investigation, study and recommendations as apply specifically to the purposes of their organizations, which is—TO FOSTER FOREIGN TRADE.

Be it therefore resolved, That the present central committee of the American Marine congress take immediate steps to make permanent this first American Marine congress in accordance with the expressed desire and general thought expressed in its session.

Marine Congress To Be Made Permanent

Success of the first marine congress caused the organizations taking part to decide in favor of a permanent body. The following committee was named to draft a working plan for the permanent organization:

Myron W. Robinson,
President American Manufacturers' Export association, chairman

Winthrop L. Marvin,
Vice-president American Steamship Owners' association

C. H. Potter,
President United States Ship Operators' association

O. E. Bradfute,
President American Farm Bureau federation

Capt. John F. Milliken,
Secretary of the Neptune association

E. E. Spafford,
Commander New York Department, American Legion

H. A. Magoun,
President Atlantic Coast Shipbuilders' association

Crack Motorship Lost on Canadian Coast

October was a disastrous month for underwriters carrying risks in the north Pacific. Unusually severe storms and fogs of exceptional density prevailed and much floating property was either lost or damaged.

The heaviest loss was that of the motorship KENNECOTT, owned by the Alaska Steamship Co. This vessel went ashore on Graham island, B. C., where she was abandoned to her fate and proved a total loss. The KENNECOTT had passed safely through the earthquake and tidal wave in Japanese waters and was returning from the Orient by way of Alaska when she went aground. The vessel was valued at about $1,000,000 while the cargo of copper and salmon is estimated at $500,000. The KENNECOTT was built at Tacoma by the Todd Drydock & Construction Corp. less than three years ago and had proved one of the best vessels of her type ever built.

While enroute to the scene of the KENNECOTT wreck, the Canadian salvage steamer ALGERINE went ashore in Queen Charlotte sound and was so seriously damaged that she was towed back to Esquimalt, B. C., where extensive repairs are under way.

The tug EQUATOR, famous as the vessel in which Robert Louis Stevenson toured the South seas, is ashore on the Washington coast south of Cape Flattery. For some time, the EQUATOR had been engaged in towing logs. She is reported to be a total loss.

The coasters ADMIRAL SEBREE and REDONDO, the Oriental freighter BEARPORT and British steamers EL LOBO and SUNLAND, were also ashore in north Pacific waters, none receiving serious damage.

October Ore Shipments

Shipments of iron ore from the Lake Superior district in October ran just over 8,000,000 tons, a decline of a few tons less than one million from the September record. But this year's total is more than 2,000,000 tons greater than in the corresponding month last year. The season's total to Oct. 31 is nearly 15,000,000 tons higher than in the like period of last year. The detailed figures follow:

Port	October, 1923	To Nov. 1, 1923
Escanaba	605,173	5,169,700
Marquette	361,193	2,482,179
Ashland	700,407	5,900,101
Superior	2,658,437	16,410,222
Duluth	2,914,222	18,224,497
Two Harbors	860,284	5,901,862
Total	8,099,716	54,088,561
1923 increase	2,018,330	14,895,937

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

A TUG employed merely to assist a steamship which was proceeding under her own power, in passing through a canal, and subject to the orders of the steamship, is not liable *in rem* for a collision between the steamship and another vessel, resulting from obeying the orders of the steamship; there is no principle of law which forbids a tug to subject itself to the orders of the steamship, whose movements it is merely assisting.—STELLA, 278 *Federal Reporter* 939.

* * *

The object and purpose of inland rule 15, providing that in fog, mist, falling snow, or heavy rainstorms, whether by day or night, a steam vessel under way shall sound, at intervals of not more than one minute, a prolonged blast, is to make known the vessel's position in the fog or bank because of the obscured vision, it was held in the case of WILLIAM H. TAYLOR, 278 *Federal Reporter* 717. "It was just as needful," said the court, "to blow a signal when the vessel was enveloped in a bank of vapor due to intense cold as would be the case when enveloped in a fog. The rule is imperative, and omission to blow signals on the part of a vessel has long been considered a positive breach of the statute, which puts her in the wrong."

* * *

A scow owner, desirous of making delivery of coal, assumed all risks of damage to the scow produced by ice, where he consented that she be towed in the ice conditions of the waters; but he did not assume risk of collision with other vessels, due to the insufficient power of the steam tug having charge of the tow.—R. G. TOWSEND, 278 *Federal Reporter* 726.

* * *

The liability of an insurer against war risks was involved in the case of Queen Insurance Co. of America v. Globe & Rutgers Fire Insurance Co., 278 *Federal Reporter* 770, in which it appeared that the insured vessel was one of a convoy of cargo boats proceeding from Genoa to Gibraltar, and that in June, 1918, she collided with a steamship, which was one of another convoy of similar vessels, and soon thereafter sank. The policy insured against "acts in prosecution of hostilities between belligerent nations." The court said that "sailing with a general cargo, however, contraband (for, municipally speaking, there is nothing unlawful about contraband), can not be a warlike operation; the mere joining of a convoy, though compulsory, is not a warlike operation; the management or mismanagement of a convoy is likewise not a warlike operation; and, indeed, operations only become warlike when they are designedly offensive, or where the injury causing loss is proximately due to an enemy effort." It was then held that the war risk policy did not fully supplement a policy insuring against other perils "free from all consequences of hostilities or warlike operations," and that the insurer was not liable for the loss of the vessel.

* * *

Whenever a vessel undertakes to do anything for hire, there is an implied warranty of seaworthiness. Such implied warranty, however, does not stand on the same footing as an express warranty personally made by the owner, said the court in the case of Pocomoke Guano Co. v. Eastern Transportation Co., 278 *Federal Reporter* 745; further, it does not preclude him from limitation of liability for the loss of cargo through unseaworthiness, due to an unknown defect not readily discoverable, and the failure to discover which was not due to his negligence.

* * *

The purpose of section 4529 of the United States revised statutes, which provides that a master or owner who refuses or neglects to pay every seaman his wages within a certain time without sufficient cause, shall pay a sum equal to two days' pay for each day during which such payment is delayed, and which sum shall be recoverable as wages, is to secure to the seamen an amount as extra pay by way of compensation for delay. The extra pay is an incident to the claim of wages proper, it was held in Gerber v. Spencer, 278 *Federal Reporter* 886, and though the "penalty" is imposed for refusal to pay wages, not for refusal to meet all demands which seamen may see fit to make, it cannot affect a case where there is no sufficient excuse for the refusal or neglect for nonpayment which has resulted in keeping the seamen in port at expense and out of employment while waiting the settlement. The circumstance, said the court, that the owner of the vessel was in financial difficulties did not relieve it from an obligation with respect to claim for wages, including extra pay. The general rule that rights of other creditors are subordinate to a claim for wages is applicable, it was held; the rights of seamen have always been cautiously guarded by statutes, and it was said that the courts should make their decrees in accord with the spirit and intent of the law to protect the seamen.

* * *

A tug master, stationed on the forecastle head of a schooner in tow, who directed her course, trying merely to make her follow another tug, towing ahead, was a pilot in the sense that he was a licensed man, and also in the sense that he was the officer on board having charge of the helm and of the ship's route and that he was a person taken on board at a particular place for the purpose of conducting a ship through a river, road, or channel, or from or into a port; he was not a compulsory pilot, but one voluntarily accepted as the result of a contract, and the vessel is liable *in rem* for a collision caused by the pilot's negligent orders.—MAREN LEE, 278 *Federal Reporter* 918.

* * *

"Hardship, of course," said the court in the case of AUTOMATIC, 278 *Federal Reporter* 359, "sometimes results from a compliance with rules, where a navigator thinks departure may be the wiser course, but, in the long run, safe navigation is better served by strict application of the rules than by resort to exceptions in order to exculpate."

* * *

The case of W. R. Grace & Co. v. Ford Motor Co. of Canada, Ltd., 278 *Federal Reporter* 951, involved an action for breach of contract commenced before performance was due, based upon a claimed repudiation of the contract, but which repudiation was not accepted by the libelant as such, because it held 1100 packages as freight delivered in pursuance to the contract after such repudiation, and proceeded to foreclose a maritime lien against it as such in the very action based upon such repudiation. Libelant, it was stated by the court, could not for one purpose hold the contract as broken, and for another regard it as in process of being performed. "It could not," quoting from the decision, "before performance was due, maintain an action as for an anticipatory breach of the contract, and in the action itself proceed *in rem* against freight that could not be held as such, unless delivered under and in part performance of the same contract. It is true that in the admiralty an action will sometimes be sustained, even though prematurely brought, where there is some good reason for doing so. But where, as here, performance was not due at the time the action was commenced, where performance of at least a substantial portion of the contract was offered by respondent, and where there is a very grave question as to whether libelant itself was or would be in a position to carry out its portion of the contract, however, willing to do so, I do not think that justice requires, or indeed will permit, the maintenance of the action upon an anticipatory breach, unless, when the libel was filed, such breach would sustain it."

Late Decisions in Maritime Law

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Attorney at Law

A PROPOSED charter, on which were stamped provisions making it subject to approval by the British authorities, and not binding on owners until notice of such approval, and providing that the charterers must sign and abide by the British bunker rules before it would become effective, was a charter party, and not an agreement to make one, and bound the charterers to sign such rules, and was broken by their failure to do so.—A. O. Anderson & Co., Inc., v. Texas Co., 279 *Federal Reporter*, 76.

* * *

Admiralty may award, against a consignee who accepts cargo from a ship, damages for any wrongful detention of it, and that irrespective of whether the respondent was or was not an original party to the bill of lading or other contract of carriage. * * * One who sells goods, and enters into a contract with a ship to load them upon her, has become bound to her for an undertaking maritime in its nature."—French Republic v. Fahey, 278 *Federal Reporter* 947.

* * *

The master of a vessel asked libelant in the case of ASCUTNEY, 278 *Federal Reporter* 991, a ship's agent and broker, to act as agent for the ship's business while in port on a particular voyage, which libelant agreed to do, and with the master's approval libelant paid certain of the ship's bills, the greater part being for charges imposed by law, as pilotage, fumigation fees and charges, and tonnage tax. It was held that libelant was entitled to a lien for such charges and for taxi hire, telephone tolls, postage, and compensation of a night engineer, as well as libelant's attendance fee.

* * *

A custom for vessels descending the East river to pass between the Corlear's reef drill boat and the Manhattan shore can not override the statutory rules of navigation, it was decided in the case of MORRISTOWN, 278 *Federal Reporter* 714.

* * *

Under a charter which recited that "it is estimated that the vessel will carry 225 tons, more or less, but not binding," as in the case of EMILY S. MALCOLM, 278 *Federal Reporter* 943, the vessel was entitled to recover the full balance of freight remaining unpaid, though the capacity of the vessel was only 125 tons. The word "estimated," it was said, itself implies an absence of contract certainty, and when to this uncertainty of an estimate are added the words "but not binding" there is an entire absence of those elements of certainty which would justify construing a statement of the supposed and, therefore, uncertain tonnage capacity of the ship into the certainty of an absolute and ascertained guaranty of tonnage.

* * *

"'Default'" (as used in a charter party in the common form) "does not mean 'fault,' but merely failure to comply with the agreement to complete the loading in the stipulated time. The only exception is *vis major* or its equivalent. * * * Generally speaking, losses caused by government interference with the performance of contracts are left where they fall; they are not to be transferred from one person to another, unless the latter has contracted to take the risk of them, or is otherwise obliged to do so. * * * It is well settled that the charterer does not warrant that there shall be no detention."—P. Dougherty Co. v. 2471 Tons of Coal, 278 *Federal Reporter* 799.

* * *

"Tugs owe a high degree of diligence to look after lives and property committed to their care, when, from force of circumstances, the tow is set adrift, or has to be cast off, or even temporarily abandoned. The obligation to stand by should be strictly observed, as long as it is reasonably safe and proper to do so. The duty of the tug to return at the earliest moment, and vigorously attempt to care for those in danger and distress, who can not get away because of lack of motive power, is manifest, as well from the relation they occupy to the tug as from the plainest sense of humanity. Failure to do so constitutes negligence, and for losses resulting therefrom there is liability on the tug, especially where it appears that the loss and damage might have been avoided by the proper discharge of those plain obligations."—Maryland Transportation Co., v. Dempsey, 279 *Federal Reporter* 94.

* * *

It was decided in the case of Alwen V. Fisher, 279 *Federal Reporter* 164, that under the act of June 10, 1918, and the rules and regulations promulgated thereunder, providing for appeals from decisions of boards of local inspectors of vessels to the supervising inspector of the district, and that any supervising inspector may, within 30 days thereafter, on his own motion, review any such decision, and may revoke, change, or modify the same, such proceeding before a supervising inspector is an appellate proceeding for re-examination of the decision of the local board, and a supervising inspector is given no authority to file charges before himself against the master of a vessel in collision, and to conduct an independent hearing thereon, ignoring a prior decision of the local board, not appealed from, determining responsibility for the collision.

* * *

A charterer of a barge, it was decided in the case of JUNIOR, 279 *Federal Reporter* 407, was negligent in leaving the barge moored at an exposed berth, which was unnecessarily dangerous, after storm warnings and the conditions of weather and ice in the river became known to the charterer. It was further held that where the master of the barge appointed and paid by the owner remained in charge of the barge after it was chartered, his negligence in absenting himself from the barge while it was moored in a dangerous position and exposed to a storm, of which warning had been given, was imputable to his employer, the owner.

* * *

In order that a seaman may receive wages it must appear, said the court in the case of CITY OF NORWICH, 279 *Federal Reporter* 687, not only that there was a valid contract of employment, but that he has performed his contract until the voyage was completed, or his term of service expired or show some legal and sufficient excuse for nonperformance. The defence in this case was that the seaman had deserted, and the court held that the burden of proving desertion is always upon the owner of the ship, who sets it up in answer for a claim to wages. The court defined desertion as consisting in the abandonment of duty by quitting the ship before the termination of the engagement, without justification, and with the intention of not returning. Desertion has always been regarded by the maritime law as very serious misconduct. A Hanseatic ordinance of 1380 made it a crime punishable by death, and a later ordinance of 1591 made it punishable by branding, and various early ordinances made it punishable by imprisonment. And even under article 221 of the Merchant Shipping act of Great Britain of 1894, a seaman on a British ship who deserts is still liable under some circumstances to imprisonment.

* * *

It is the duty of the master to maintain effective discipline on his vessel, and he has the power to inflict punishment for that purpose. Confinement is a recognized form of punishment. But it should ordinarily be inflicted on board the vessel; causing a seaman to be removed from his vessel and confined in the jail of a foreign tropical country is treatment which is not justified, except in extreme cases. It removes the seaman from the surroundings to which he is accustomed, and from the control and protection of the master, and subjects him to dangers and difficulties which may be very great.—Latty v. Emergency Fleet corporation, 279 *Federal Reporter* 752.

Business News for the Marine Trade

Marine Supply Co., Wilmington, N. C., has increased its capital stock from $10,000 to $75,000.

Potter Tow Boat Co., Wilmington, N. C., was incorporated for $50,000 by L. D. Potter, Daniel H. Scott and others.

Contract for two car ferry steamers has been awarded the Toledo Shipbuilding Co., by the Canadian National Railways, according to reports.

J J. Ryan, secretary of the Three Rivers Harbor commission, Three Rivers, Ont., will purchase machinery for loading and unloading ships.

Penn Yan Boat Co., Penn Yan, N. Y., has let contracts for constructing new factory building to be ready Jan. 1. It will be of steel concrete, and hollow tile, 50 x 186 feet, 1-story. A retaining wall is to be built and another building constructed next year.

The Davie Shipbuilding & Repairing Co., Ltd. Lauzon, Que., has let the general contract for erecting a $15,000 joiner shop and is taking bids on special machinery.

The Canadian Watercraft, Ltd., Peterborough, Ont., is asking for machinery, tools and general equipment for the manufacture of boats, scows, barges, etc.

The Ansonia Steamship Corp., Dover, Del., recently was incorporated.

The Golden Gate Navigation Co., Inc., Wilmington, Del., was incorporated recently.

The New York Dock Co., 44 Whitehall street, New York, plans a 2-story addition to its works at 88-106 Commerce street, Brooklyn, at a cost of $22,000.

The One-Hundredth Street Dock Co., 429 East 100th street, New York, has plans for a 1-story addition.

Vickers, Ltd., has taken over the engineering firm Marshall, Sons & Co., Ltd., Gainsbrough, where extensive developments are planned.

Cholberg Shipyards, Victoria, B. C., has been opened after being shut for two years, by Christian Cholberg, who plans constructing wooden vessels of small tonnage.

John Baizley Iron Works, Philadelphia, has been awarded contract for extensive repairs to the Honduran steamship FAVORITA which recently was damaged badly.

Osprey Towing Corp., New York, has filed dissolution papers with the secretary of state at Albany, N. Y.

Todd Shipbuilding Corp., New York., is to establish offices in Rio de Janeiro, to take care of South American interests. J. Irvine Milne will be in charge of the new offices.

The British steamer SANTA GERTRUDIS has been purchased for service in the Mexican States Line from California to Mexico by the Clan Line.

The Crowley Shipyards was awarded order from W. R. Grace & Co., for tugboat to be used at Titicaca, Chile.

Ocean Terminal Co., has been organized to handle the dock work of the Scott organizations and other lines in San Francisco. Harry S. Scott, president of the General Steamship Corp., and Trans Oceanic Co., was chief organizer.

Moore & McCormack, operator of the Commerical Steamship Lines, has established a coastwise service between Wilimington, Del., Philadelphia and New Orleans. Monthly service will be inaugurated.

Coalports Transportation Corp., New York, was incorporated for $10,000 to engage in navigation, by J. A. Sheridan, A. E. Flanders, H. V. Boyle. Attorney is C. C. Lockwood, 511 Fifth avenue.

Harborcraft Transfer Corp., Wilmington, Del., was incorporated for $50,000 to operate boats.

Marmac Transportation Co., Wilimington, Del., was incorporated for $1,500,000 to carry on transportation with vessels, by James A. McDavid, Harry F. Martin, Clayton C. Wright, and Stanley Safreed, Pittsburgh.

Pittsburgh & Memphis Transportation Co., was incorporated at Wilmington, Del., for $400,000 to operate boats.

Steamship Deerfield Corp., Wilmington, Del., was incorporated for $175,000.

Capitalization of the Stromberg Import & Export Co., has been reduced from $1,000,000 to $400,000.

Standard Oil Co., of New York has purchased the well-known Bayles Shipyard, Port Jefferson, L. I., the property being owned by the New York Harbor Dry Dock Corp.

B. L. Shipping Co., New York, was incorporated for $250,000 by O. M. Bernuth, G. J. Thompson and W. Neale to engage in the shipping business.

Port Co., New York, was incorporated for $10,000 by J. V. and M. Auditore.

City Island Boat Corp., City, Island, N. Y., was incorporated for $10,000 by B. Randall, R. Jacob, Jr., with J. H. Esser, Mt. Vernon, as attorney.

Eastern Steamship Corp., Grand Island, N. Y. was incorporated for $1,000,000 to engage in the transportation business with N. Grammer, J. J. Rammacher and E. T. Douglass as incorporators.

Everett Bros. Motor Co., Athens, Ga., has acquired property at Brunswick, Ga., previously devoted to production of marine engines. Thomas R. Everett, president of the Everett company plans improvement of works and installation of equipment for manufacture of a special engine which he has developed.

Wellston Metal Products Co., Wellston, O., was incorporated to take over the plant formerly operated by G. L. Ferris, McArthur, O., to manufacture minnow traps, sectional steel boats, steam cookers, etc. The business will be moved to Wellston.

A large interest in the Great Lakes Boat Building Corp., 333 Becher street, Milwaukee, has been taken over by a Chicago syndicate and plans are being made to transfer the works to Chicago. Construction of the new plant at Belmont avenue and the north branch of the Chicago river is expected to begin about March 1. The investment represents approximately $750,000. The Milwaukee company is one of the largest manufacturers in the world of pleasure water craft, speed boats, express cruisers and similar vessels and recently arranged with the Packard Motor Car Co., to build in quantities a 26-foot runabout with a Packard power plant modified for marine use. These will be distributed through the Packard agency organization and require much larger production facilities than are now at hand in the Milwaukee works. William C. Morehead will continue as president and Walter D. Beauvais, now with the engineering department of the Naval Air service will become chief engineer.

Diamond Steamboat & Wrecking Co., Wilmington, N. C., is improving its property on Eagles Island, also its dock for loading and unloading floating equipment, etc.

Capt. John Barneson sold recently his controlling interest in the Associated Terminals, San Francisco and Sacramento, to Gerald Fitzgerald of the Union Terminal Warehouse Co., Los Angeles. The Los Angeles interests will take over the China Basin warehouses, the Spear street warehouse, San Francisco, and the Sacramento Valley dock and warehouse at Sacramento.

The Atlantic Fruit Co. has gone into receivership affecting the holding company only and not the various subsidiaries.

Business Changes

R. S. Silva & Co., general agents for the Latin-American line, have moved from 101 Front street to 149 California street, San Francisco.

* * *

Pillsbury & Curtis, marine surveyors and naval architects, have opened a branch office in Wilmington, Cal., in the First National bank building. Frank S. Dupuy has been appointed branch manager. Pillsbury & Curtis were recently made Pacific coast representatives for the Merritt, Chapman & Scott Corp., New York.

New Trade Publications

WOOD WORKING MACHINE—A machine called the universal woodworker and consisting of a combination band saw, rotary saw, jointer, shaper and borer is described and illustrated in a catalog recently issued by the Crescent Machine Co., Leetonia, O. Each separate field of the machine is discussed and the various parts are indicated in the illustrations.

TOOL AND CUTTER GRINDING—In a 120-page illustrated booklet, the Norton Co., Worcester, Mass., has endeavored to give an idea of the many tools and cutters which can be ground on a universal machine. A description of the machine follows together with a discussion of problems encountered in grinding and illustrations showing the proper method of doing the work.

OIL BURNER—Low pressure oil burners operating on pressures of 8 ounces to 12 pounds are illustrated in a bulletin recently issued by the Hauck Mfg. Co., Brooklyn, N. Y. The burners are shown in operation at quarter, half, full and off positions, the photographs of the burner being taken in the open air to emphasize the completeness of atomization attained.

DIESEL ENGINES—A catalog recently issued by the Fulton Iron Works Co., St. Louis, contains an account of the manufacture and operation of diesel engines. A number of plant installations, parts, accessories, etc., are illustrated and fuel and heat consumption and amount of cooling water required are represented by means of diagrams.

PIG IRON—Distinctive features of Mayari pig iron are covered in a hand book issued by the Bethlehem Steel Co., Bethlehem, Pa. The data given covers foundry practice, metallurgy of the iron, technical data and tables and discussions of the various uses for which castings from this iron are now employed.

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Morse, A. J., & Son, Boston, Mass.

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Cummings Machine Works,
255 Atlantic Ave., Boston, Mass.

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Cramp, Wm., & Sons, Ship & Engine Bldg. Co., Philadelphia, Pa.
Post, E. L., & Co., Inc.,
50 Cliff St., New York, N. Y.

BELLS

Tiebout, W. & J.
118 Chambers St., New York, N. Y.

BEACON LIGHTS (Aeroplane)

Sperry Gyroscope Co.,
Manhattan Bridge Plaza, Brooklyn, N. Y.

BINNACLES

Ritchie, E. S., & Sons, Brookline, Mass.

BELLS (Electrical & Mechanical)

Chas. Cory & Son, Inc.,
183 Varick St., New York, N. Y.

BLOCKS

Boston & Lockport Block Co.,
124 Condor St., E. Boston, Mass.
Marine Decking & Supply Co.,
Easton, Pa.

BLOWERS (Flue)

American Shipbuilding Co., Cleveland, O.

BLOWERS (Motor Driven Ventilation)

Diehl Mfg. Co., Elizabeth, N. J.

BLOWERS (Soot)

Diamond Power Specialty Corp.,
Detroit, Mich.

BOATS (Steel and Wood)

Welin Davit & Boat Corp.,
305 Vernon Ave., Long Island City, N. Y.

BOILER CLEANING DEVICES

Roto Co., The,
74 Union Place Hartford, Conn.

BOILER NOZZLES

Continental Iron Works, The,
West and Caylar Sts., Brooklyn, N. Y.

BOILER RIVETS

Oliver Iron & Steel Corp.,
10th and Muriel Sts., Pittsburgh, Pa.

BOILER TUBES

Johnson-Peter Co.,
45th St. and 1st Ave., Brooklyn, N. Y.

BOILER STEAM AND WATER DRUMS (Welded)

Continental Iron Works, The,
West and Calyar Sts., Brooklyn, N. Y.

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Almy Water Tube Boiler Co.,
184 Allen St., Providence, R. I.
American Ship Building Co., Cleveland, O.
Babcock & Wilcox Co.,
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Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Federal Shipbuilding Co.,
26 Beaver St., New York, N. Y.
Fletcher, W. & A., Co. Hoboken, N. J.
Foster Marine Boiler Corp.,
111 Broadway, New York, N. Y.
Great Lakes Engineering Works,
River Rouge, Mich.
Oldman-Magee Boiler Works,
36-40 Illinois St., Buffalo, N. Y.
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Toledo Ship Building Co., Toledo, O

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85 Liberty St., New York, N. Y.

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Wager Furnace Bridge Wall Co.,
108 Academy St., Jersey City, N. J.

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1204 Prudential Bldg., Buffalo N. Y.
Farley, Edward, P., Co., Chicago, Ill.

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Whiting, John L.—J. J. Adams Co.,
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BURNERS (Acetylene)—See TORCHES

BURNERS AND BRAZING OUTFITS (Acetylene, Blow, Oxy-Acetylene)

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Peabody Engineering Co.,
110 East 42nd St., New York, N. Y.

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National Malleable Castings Co.,
10600 Quincy Ave., Cleveland, O.
Whitlock Cordage Co., New York, N. Y.

CALCIUM CARBIDE

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CALKING COTTON

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Superior Iron Works Co., Superior, Wis.

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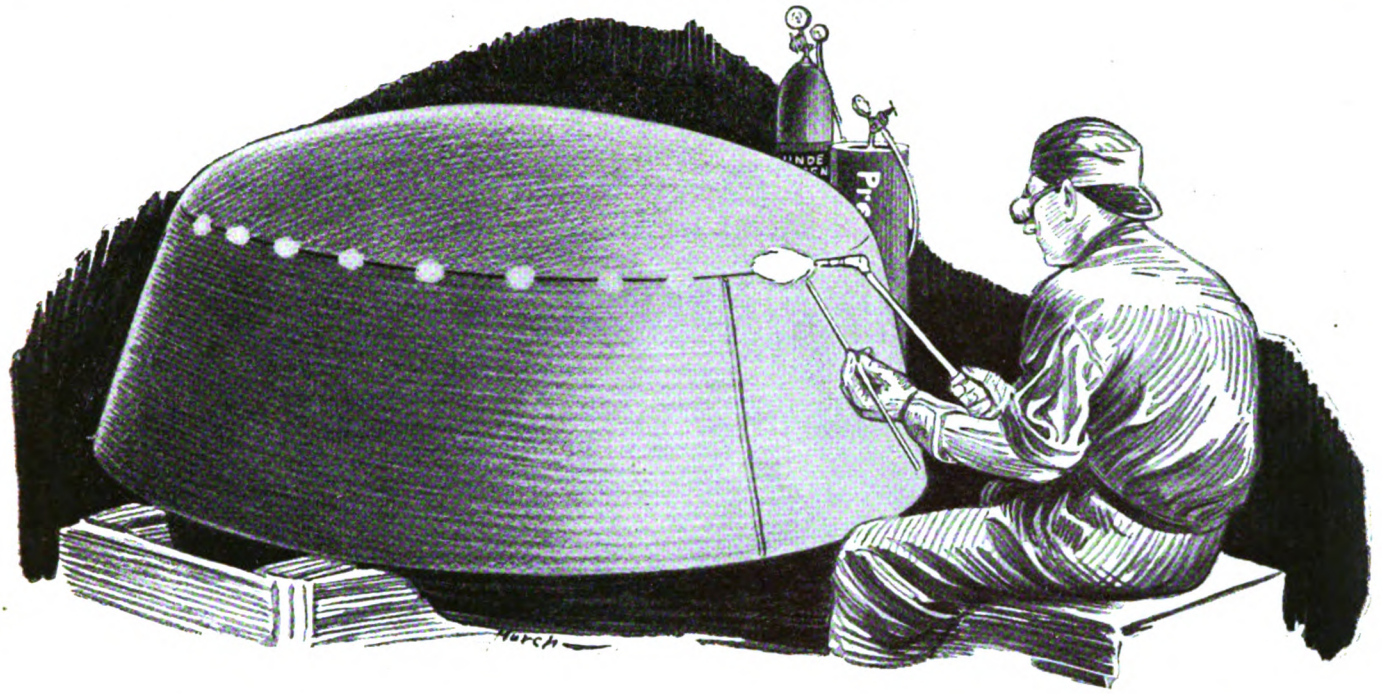

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Busch-Sulzer Bros.-Diesel Engine Co.,
2nd and Utah Sts., St. Louis, Mo.
Chicago Ship Bldg. Co., So. Chicago, Ill.
Fletcher, W. & A., Co., Hoboken, N. J.
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Superior Iron Works Co., Superior, Wis.
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Trout, H. G., Co.,
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EVAPORATORS
United American Lines, Inc.,
39 Broadway, New York, N. Y
Griscom-Russell Co.,
2121 West St. Bldg., N. Y. C.
Row & Davis, 90 West St., New York, N .Y.

FANS (Electric)
Diehl Mfg. Co., Elizabeth, N. J.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

FIXTURES (Electrical)
General Electric Co., Schenectady, N. Y.

FLOOD LIGHT PROJECTORS—See PROJECTORS (Electric Flood Light)

FORGING (Iron and Steel)
Oliver Iron & Steel Corp.,
10th and Muriel Sts., Pittsburgh, Pa.

FOUNDERS
American Shipbuilding Co., Cleveland, O.
Todd Shipyards Corp.,
25 Broadway, New York City.

FREIGHT SERVICE
United American Lines, Inc.,
39 Broadway, New York, N. Y.

FUEL OIL
Tidewater Oil Sales Corp.,
11 Broadway, New York, N. Y.
Vacuum Oil Co.,
61 Broadway, New York, N. Y.

FUELING COMPANIES AND COAL DEALERS
Hanna, M. A., Co., The, Cleveland, O.

FURNACE BRIDGE WALLS
Booth, W. W.
26 Cortlandt St., New York, N. Y.
Sturrock Furnace Bridge Wall Co.,
26 Cortland St., New York, N. Y.
Wager Furnace Bridge Wall Co.,
108 Academy St., Jersey City, N. J.

FURNACE FRONTS AND DOORS
Continental Iron Works, The,
West and Caylar Sts., Brooklyn, N. Y.

FURNACES (Boiler)
Continental Iron Works, The
West and Caylar Sts., Brooklyn, N. Y.

FURNITURE
The Orsenigo Co., Inc.
Skillman Ave., Long Island City, N. Y.

FUSES (Electrical)
General Electric Co., Schenectady, N. Y.

GAS (Acetylene Dissolved)
Prest-O-Lite Co., Indianapolis, Ind.

GAS PRODUCERS
Air Reduction Sales Co.,
342 Madison Ave., New York, N. Y.

GAS (Nitrogen and Oxygen)
Linde Air Products Co.,
42nd St.Bldg. New York N. Y.

GAS (Welding & Cutting)
Prest-O-Lite Co., Indianapolis, Ind.

GEARS (Marine Equipment)
Westinghouse Electric & Mfg. Co.,
E. Pittsburgh, Pa.

GENERATORS
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
General Electric Co. Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

GENERATORS (Acetylene)
Air Reduction Sales Co.,
342 Madison Ave., New York, N. Y.

GENERATING SETS (Direct Connected)
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.

GOVERNORS (Anticipating Marine)
Chas. Cory & Son, Inc.,
183 Varick St., New York, N. Y.

GREASE
Tidewater Oil Sales Corp.,
11 Broadway, New York, N. Y.
Vacuum Oil Co.,
61 Broadway, New York N. Y.

GREASE (Launching)
Tidewater Oil Sales Corp.,
11 Broadway, New York, N. Y.
Vacuum Oil Co.,
61 Broadway, New York, N. Y.

GREASE CUPS
Lunkenheimer Co., The, Cincinnati, O.

GYRO-PILOT
Sperry Gyroscope Co.,
Manhattan Bridge Plaza, Brooklyn, N. Y.
American Engineering Co.,
Cumberland & Aramingo Sts.,
Philadelphia, Pa.

HARDWARE (Marine)—See MARINE HARDWARE

HATCH FASTENERS
Mulholland Hatch-Fastener Co.,
Marion Bldg., Cleveland, O.

HAWSERS (Manilla)
Columbia Rope Co., Auburn, N. Y.
Whitlock Cordage Co.
46 South St., New York, N. Y.

HEATERS AND PURIFIERS (Feed water)
Griscom-Russell Co.,
2121 West St. Bldg., New York, N. Y.
Row & Davis, 90 West St., New York, N. Y.

HEATING EQUIPMENT
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

HOISTING ENGINES AND EQUIPMENT
Superior Iron Works Co., Superior, Wis.

HOISTING AND TRANSMISSION ROPE (Manilla)
Whitlock Cordage Co., New York, N. Y.

HOISTS (Air)
American Ship Building Co. Cleveland, O.
Boston & Lockport Block Co.,
124 Condor St., E Boston, Mass.
General Electric Co., Schenectady, N. Y.
Great Lakes Engineering Works,
River Rouge, Mich.

HOISTS (Electric, Pneumatic, Hand)
Superior Iron Works, Superior, Wis.

ICE MACHINES (See Refrigerating Machinery)

INDICATORS
Chas. Cory & Son, Inc.,
183 Varick St., New York. N. Y.

INDICATORS (Helm Angle)
Sperry Gyroscope Co.,
Manhattan Bridge Plaza, Brooklyn, N. Y.

INSURANCE (Marine)
Boland & Cornelius,
1204 Prudential Bldg., Buffalo, N. Y.
Osborn Co., 175 W. Jackson Blvd.,
Chicago, Ill.
Prindiville, John, & Sons,
332 S. La Salle St., Chicago, Ill.

INTERIOR FITTINGS (Marine)
Tiebout, W. & J.,
118 Chambers St., New York, N. Y.

IRON ORE
Hanna M. A., Co., The, Cleveland, O.

JOINER EQUIPMENT
Tiebout, W. & J.,
118 Chambers St., New York, N. Y.

LAMPS (Mazda and Arc)
General Electric Co., Schenectady, N. Y.

LATCHES (Ship)
Tiebout, W. & J.,
118 Chambers St., New York, N. Y.

LIGHTS (Electric)
Chas. Cory & Son, Inc.,
183 Varick St., New York, N. Y.
General Electric Co., Schenectady, N. Y.

LIFE BOATS, RAFTS, SUITS PRESERVERS AND LIFE SAVING EQUIPMENT
Brauer, Justus, & Son, Inc.,
129 Arch St., Philadelphia, Pa.
National Life Preserver Co.,
11 Broadway, New York, N. Y.
Welin Davit & Boat Corp.,
305 Vernon Ave., Long Island City, N. Y.

LIGHTING EQUIPMENT
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

LOCKS (Ship)
Tiebout, W. & J.,
118 Chambers St., New York, N. Y.

LOGS (Patent)
Walker, Thomas, & Son, Ltd.
58 Oxford St., Birmingham, England.

LUBRICATORS
Lunkenheimer Co., The, Cincinnati, O.

LUBRICATING OIL
Tidewater Oil Sales Corp.,
11 Broadway, New York, N. Y.
Vacuum Oil Co.,
61 Broadway, New York, N. Y.

MACHINERY (Marine)
American Ship Building Co., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Chicago Ship Building Co., So. Chicago, Ill.
Fletcher W. & A., Co., Hoboken, N. J.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Superior Ship Building Co., Superior, Wis.
Toledo Ship Building Co., Toledo, O.

MACHINISTS
American Shipbuilding Co., Cleveland O.
Federal Shipbuilding Co.,
26 Beaver St., New York, N. Y.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Todd Shipyards Corp.,
25 Broadway, New York, N. Y.

MANILA OAKUM—See OAKUM (Marine Rope, Packings, Plumbers)

MARINE DECKING—See DECKING (Marine)

MARINE HARDWARE
Laughlin, Thomas, Co., Portland, Maine.
Marine Decking & Supply Co.,
Easton, Pa.
Tiebout, W. & J.,
118 Chambers St., New York, N. Y.

MARINE GLUE
Carpenter, Geo. B., & Co.,
440 N. Wells St., Chicago, Ill.

MARINE METAL
Post, E. L., & Co., Inc.,
50 Cliff St., New York, N. Y.

MARINE OIL—See OIL (Marine)

MARINE PAINT—See Paint (Marine)

MARINE RAILWAY BUILDERS
Crandall Engineering Co.,
102 Border St., Boston, Mass.

MARINE RAILWAYS
Cramp, Wm., & Sons Ship & Engine
Bldg Co., Philadelphia, Pa.

MARINE SUPPLIES
Carpenter, George B., & Co.,
436 N. Wells St., Chicago, Ill.
Tiebout, W. & J.,
118 Chambers St., New York, N. Y.

METAL
Post, E. L., & Co. Inc.,
50 Cliff St., New York, N. Y.

METAL PROTECTION (Paint)
Eagle-Picher Lead Co.,
208 So. La Salle St., Chicago, Ill.

MOTOR GENERATOR SETS
Diehl Mfg. Co., Elizabeth, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

MOTORS (Electric)
Diehl Mfg. Co., Elizabeth, N. J.
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.

MOTORS (Winch)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS
Carpenter George B.,
436 N. Wells St., Chicago, Ill.
Masters Manufacturing Co.,
60 State St., Boston, Mass.
Ritchie, E. S., & Sons, Brookline, Mass.
Sperry Gyroscope Co., The,
Manhattan Bridge Plaza, Brooklyn, N. Y.

NAVIGATIONAL INSTRUMENT
White, Kelvin & Wilfrid O., Co.
112 State St., Boston, Mass.

NITROGEN (Gas)
Air Reduction Sales Co.,
342 Madison Ave., New York, N. Y.

NITROGEN (Gas)
Linde Air Products Co.,
42nd St. Bldg., New York, N. Y.

NUTS—See BOLTS AND NUTS

OAKUM (Marine, Rope, Packings Plumbers)
Stratford, George, Oakum Co.,
165 Cornelison Ave., Jersey City, N. J.

OIL BURNING EQUIPMENT
Babcock & Wilcox Co., The,
85 Liberty St. New York, N. Y.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Peabody Engineering Co.,
110 East 42nd St., New York, N. Y.
White Fuel Oil Engineering Corp.,
25 Broadway, New York City.

OIL CUPS
Lunkenheimer Co., The, Cincinnati, O.

OIL FOR ALL PURPOSES (Marine)
Tidewater Oil Sales Corp., 11 Broadway, New York, N. Y.
Vacuum Oil Co., 61 Broadway, New York, N. Y.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene Process)

OXY-ACETYLENE
Air Reduction Sales Co., 342 Madison Ave., New York, N. Y.

OXYGEN (Gas)
Air Reduction Sales Co., 342 Madison Ave., New York N. Y.
Linde Air Products Co., 42nd St. Bldg., New York, N. Y.
Oxweld Acetylene Co., 646 Frelinghuysen Ave., Newark, N. J.

PACKING (Tarred and Untarred Jute)
Stratford, George, Oakum Co., Jersey City, N. J.

PAINT (Marine)
Eagle-Picher Lead Co., 208 So. La Salle St., Chicago Ill.
New Jersey Paint Works, Harry Louderbough, Inc., Wayne & Fremont Sts., Jersey City, N. J.

PAINT (Metal Protective)
Eagle-Picher Lead Co., 208 So. La Salle St., Chicago, Ill.

PAINT & PROOFINGS (Canvas)
Robeson Preservo Co., Port Huron, Mich.

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International Mercantile Marine Co. 9 Broadway, New York, N. Y.
United American Lines, Inc., 39 Broadway, New York, N. Y.

PATENTS
Siggers & Siggers, Washington, D. C.

PHONOGRAPHS (Period Models)
The Orsenigo Co., Inc., Skillman Ave., Long Island City, N. Y.

PIG IRON
Hanna, M. A., Co., The, Cleveland O.

PIPE BENDING MACHINERY—See MACHINERY (Pipe Bending)

PIPE (Iron and Steel)
Continental Iron Works, The, West and Calyer Sts., Brooklyn, N. Y.

PLASTER FIBRE
Stratford, George, Oakum Co., Jersey City, N. J.

PLATES (Floor)
American Pressed Steel Co., Philadelphia, Pa.

PLUMBERS' OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

PROJECTORS (Electric)
General Electric Co., Schenectady, N. Y.

PROPELLERS
Akimoff Propeller Co., Harrison Bldg., Philadelphia, Pa.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Columbian Bronze Corp., Freeport, L. I., N. Y.
Cramp, Wm., & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.
Hyde Windlass Co., Water St., Bath, Me.

PROPELLER BLADES
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER HUBS
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS
American Ship Building Co., Cleveland. O.
Detroit Ship Building Co., Detroit, Mich.
Great Lakes Engineering Works, River Rouge, Mich.
Milwaukee Dry Dock Co., Milwaukee. Wis.
Sheriffs Mfg. Co., Milwaukee, Wis.
Toledo Ship Building Co., Toledo, O.
Trout, H. G., Co., 220 Ohio St., Buffalo, N. Y.

PUMPS
Boston & Lockport Block Co., E. Boston Mass.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Great Lakes Engineering Works, River Rouge, Mich.

PUMPS (Ballast)
Warren Steam Pump Co., Warren, Mass.

PUMPS (Diaphragm)
Boston & Lockport Block Co., 123 Condor St., E. Boston, Mass.

PUMPS (Bilge)
Warren Steam Pump Co. Warren, Mass.

PUMPS (Boiler Feed)
Superheater Co., The 17 E. 42nd St., New York, N. Y.
Warren Steam Pump Co., Warren, Mass.

PUMPS (Steam)
Warren Steam Pump Co. Warren, Mass.

PURIFICATION SYSTEMS—See Water PURIFICATION SYSTEMS

PYROMETERS
Superheater Co., The, 17 E. 42nd St., New York, N. Y.

RADIO EQUIPMENT
Radio Corp. of America, Woolworth Bldg., New York, N. Y.

RAILWAY DRY DOCKS
Crandall Engineering Co., The, 102 Border St., East Boston, Mass.

REFRIGERATING MACHINERY
Brunswick-Kroeschell Co., New Brunswick, N. J.
Great Lakes Engineering Works, River Rouge Mich.
Phoenix Ice Machine Co., 2711 Church Ave., Cleveland, O.

RELEASING GEARS FOR LIFEBOATS
Welin Davit & Boat Corp., 305 Vernon Ave., Long Island City, N. Y.

RELEASING HOOK—See HOOKS Releasing)

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American Ship Building Co., Cleveland, O.
Bath Iron Works, Bath Me.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Chicago Ship Building Co., So. Chicago, Ill.
Federal Shipbuilding Co., 26 Beaver St., New York, N. Y.
Fletcher, W. & A., Co., Hoboken, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp. Manitowoc, Wis.
Todd Shipyards Corp., 25 Broadway, New York City.
Toledo Ship Bldg. Co., Toledo, O.

REVOLUTION COUNTERS
Cummings Machine Works, 255 Atlantic Ave., Boston, Mass.

RIVETS
Oliver Iron & Steel Corp., 10th and Muriel Sts., Pittsburgh, Pa.

RIVETS (Boiler)—See BOILER RIVETS

RIVETS (Ship)
Great Lakes Engineering Works, River Rouge, Mich.

ROPE (Manilla)
Columbian Rope Co., Auburn, N. Y.

ROPE (Manilla Net, Sisal and Other Hard Fiber Cordage)
Columbian Rope Co., Auburn, N. Y.
Plymouth Cordage Co., North Plymouth, Mass.
Whitlock Cordage Co. 46 South St., New York City, N. Y.

ROPE (Braided Cotton)
Samson Cordage Works, 88 Broad St., Boston, Mass.

ROPE (Transmission)
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co., 46 South St., New York, N. Y.

ROPE (Wire)—See WIRE ROPE

ROPE DRIVES AND TRAMWAYS
Whitlock Cordage Co., 46 South St., New York, N. Y.

ROPE OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

RUST PREVENTIVE (Oil)
Tidewater Oil Sales Corp., 11 Broadway, New York, N. Y.
Vacuum Oil Co., 61 Broadway, New York, N. Y.

SAILMAKERS
Taulane's George, Sons, 324-26 S. Front St., Philadelphia, Pa.

SCHOONERS (Auxiliary)
American Ship Building Co., Cleveland, O.
Chicago Ship Building Co., So. Chicago, Ill.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Todd Shipyards Corp., 25 Broadway, New York, N. Y.
Toledo Ship Building Co., Toledo, O.

SEARCH LIGHTS (High Intensity)
Sperry Gyroscope Co., Manhattan Bridge Plaza, Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc)
General Electric Co., Schenectady, N. Y.

SECOND HAND MACHINERY—See MACHINERY, SECOND HAND

SHAFTING (Propeller)
Columbian Bronze Corp., The Freeport, L. I., N. Y.

SHIPBUILDERS
American Ship Building Co., Cleveland, O.
Bethlehem Shipbuilding Corp., Bethlehem, Pa.
Cramp, Wm., & Sons Ship & Engine Bldg Co., Philadelphia, Pa.
Federal Shipbuilding Co., 26 Beaver St., New York N. Y.
Fletcher, W. & A., Co., Hoboken, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Todd Shipyards Corp., 25 Broadway, New York, N. Y.
Toledo Ship Building Co., Toledo, O.

SHIPBUILDING SYSTEMS
Isherwood J. W.,
17 Battery Place, New York, N. Y.

SHIP LOGS
Walker, Thomas, & Son, Ltd.,
58 Oxford St., Birmingham, England.

SHIP REPAIRS
Cramp, Wm., & Sons Ship & Engine Bldg Co., Philadelphia, Pa.

SHIP RIVETS—See RIVETS (Ship)

SHIP STABILIZERS
Sperry Gyroscope Co., The,
Manhattan Bridge Plaza, Brooklyn, N. Y.

SOFAS
The Orsenigo Co., Inc.,
Skillman Ave., Long Island City, N. Y.

SPECIALTIES (Steam)
Lunkenheimer Co., The, Cincinnati, O

SPUN OAKUM
Stratford, George, Oakum Co.,
Jersey City N. J.

STEAMSHIP LINES (Passenger and Freight)
United American Line, Inc.,
39 Broadway, New York, N. Y.

STEEL BARGES
American Bridge Co.,
71 Broadway, New York, N. Y.

STEEL FABRICATORS
Federal Shipbuilding Co.,
26 Beaver St., New York, N. Y.

STEEL TANKS
Brunswick-Kroeschell Co.,
New Brunswick, N. J.

STEERING ENGINES
Hyde Windlass Co., Walter St., Bath, Me.
Superior Iron Works Co., Superior Wis.

STEERING GEARS
American Ship Building Co., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Superior Iron Works Co., Superior Wis.

STRUCTURAL RIVETS—See RIVETS (Structural)

SUPERHEATERS (Marine)
Power Specialty Co.,
111 Broadway, New York, N. Y.
The Superheater Co.,
17 E. 42nd St., New York, N. Y.

SUPPLIES (Oxy-Acetylene Process)
Oxweld Acetylene Co.,
646 Frelinghuysen Ave., Newark, N. J.

SWITCHBOARDS
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

TABLES
The Orsenigo Co., Inc.,
Skillman Ave., Long Island City, N. Y.

TACKING LINES (Manilla)
Plymouth Cordage Co.,
North Plymouth, Mass.

TANK RIVETS—See RIVETS (Tank)

TANKS (Acetylene)
Linde Air Products Co.,
30 E. 42nd St., New York, N. Y.
Prest-O-Lite Co., Inc.,
30 E. 42nd St., New York, N. Y.

TANKS (Riveted)
Bath Iron Works, Bath Me.

TANKS (Welded Steel)
Continental Iron Works, The,
West and Calyer Sts., Brooklyn, N. Y.

TARRED ROPE OAKUM
Stratford, George, Oakum Co.,
Jersey City, N. J.

TELEGRAPH
Chas. Cory & Son, Inc.,
183 Varick St., New York, N. Y.

TELEPHONES & TELEGRAPHS (Ship)
Chas. Cory & Son, Inc.,
183 Varick St., New York, N. Y.

TERRULES (Copper Boiler Tubes)
Johnson-Peter Co.,
45th St. and 1st Ave., Brooklyn, N. Y.

THERMOMETERS
Tagliabue, G.,
32 Pearl St., New York, N. Y.

TICKETS FOR EUROPE
International Mercantile Marine Co.,
9 Broadway, New York, N. Y.

TORCHES, BURNERS, AND BRAZING OUTFITS (Acetylene, Blow, Oxy-Acetlene)
Air Reduction Sales Co.,
342 Madison Ave., New York, N. Y.

TORCHES (Welding and Cutting)
Air Reduction Sales Co.,
342 Madison Ave., New York, N. Y.

TORCHES AND BURNERS (Acetlyene Blow (Oxyactetylene)
Oxweld Acetylene Co.,
646 Frelinghuysen Ave., Newark,N. J.

TORSION METERS
Cummings Machine Works,
255 Atlantic Ave., Boston, Mass.

TOWING LINES (Manila)
Whitlock Cordage Co.
46 South St., New York, N. Y.

TRANSMISSION (Rope)—See Rope (Transmission)

TUBES (Boiler, Stay, Yarrow)
Johnson-Peter Co.,
45th St. and 1st Ave., Brooklyn, N. Y.

TUBES (Condenser)
Scovill Mfg. Co., Waterbury, Conn.

TUBES (Seamless Steel)
Johnson-Peter Co.,
45th St. and 1st Ave., Brooklyn, N. Y.

TURBINES
Fletcher, W. & A., Co.,
12th to 14th St., Hoboken N. J.

TURBINES (Electrical)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

TURBINES (Marine)
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.

TURBINES (Steam)
Cramp, Wm., & Sons Ship & Engine Bldg Co., Philadelphia, Pa.
Federal Shipbuilding Co.,
26 Beaver St., New York, N. Y.

TWINE AND ROPE
Columbia Rope Co., Auburn, N. Y.
Plymouth Cordage Co.,
North Plymouth, Mass.

UNTARRED ROPE OAKUM
Stratford, George, Oakum Co.,
Jersey City, N. J.

VALVES AND FITTINGS
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Lunkenheimer Co., The, Cincinnati O.

VALVE RESEATING MACHINES
Leavitt Machine Co., The, Orange, Mass.

WALKAWAY GRATINGS—See GRATINGS (for Floors, Walkaways, etc.)

WATERPROOFING & MILDEWPROOFING FOR CANVAS
Robeson Preservo Co., Port Huron, Mich.

WATER TUBE CLEANERS
Roto Co., The,
74 Union Place Hartford, Conn.

WELDERS (Electric Arc)
Westinghouse Electric & Mfg. Co.,
E. Pittsburgh, Pa.

WELDING (Custom)
Linde Air Products Co.,
42nd St. Bldg., New York, N. Y.
Oxweld Acetylene Co., Newark, N. J.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene Process)
Air Reduction Sales Co.,
342 Madison Ave., New York N. Y.
Oxweld Acetylene Co.,
646 Frelinghuysen Ave., Newark, N. J.
Prest-O-Lite Co., Inc., Indianapolis, Ind.

WELDING & CUTTING GAS
Prest-O-Lite Co., Indianapolis, Ind.

WELDING AND CUTTING MACHINES (Oxy-Acetylene)
Air Reduction Sales Co.,
342 Madison Ave., New York, N. Y.

WELDING GLASSES
Air Reduction Sales Co.,
342 Madison Ave., New York, N. Y.
Oxweld Acetylene Co.,
646 Frelinghuysen Ave., Newark, N. J.

WELDING RODS
Air Reduction Sales Co.,
342 Madison Ave., Ne wYork, N. Y.
Oxweld Acetylene Co.,
646 Frelinghuysen Ave., Newark, N. J.
Prest-O-Lite Co., Inc., Indianapolis, Ind.

WHISTLES
Lunkenheimer Co., The, Cincinnati, O.

WHITE LEAD
Eagle-Picher Lead Co.,
208 So. La Salle St., Chicago, Ill.

WINCHES
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Hadfield-Penfield Steel Co., The,
Bucyrus, Ohio.
Hyde Windlass Co., Water St. Bath, Me.
Superior Iron Works, Superior, Wis.

WINDLASSES
American Ship Building Co., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Carpenter George B., & Co.,
436 N. Wells, Chicago, Ill.
Hadfield-Penfield Steel Co., The, Bucyrus, O.
Hyde Windlass Co., Water St., Bath Me.
Superior Iron Works Co., Superior Wis.

WIRE AND WIRING DEVICES
General Electric Co., Schenectady, N. Y.

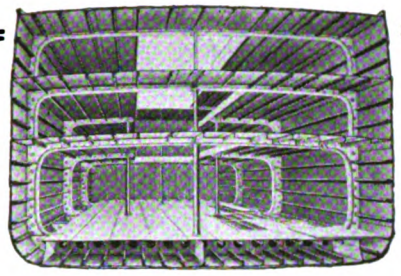
WIRE ROPE
Durable Wire Rope Co.,
93 Pearl St., Boston, Mass.

WIRELESS SETS AND APPARATUS
Radio Corp. of America,
Woolworth Bldg., New York, N. Y.

WOOD BORING MACHINES—See MACHINERY (Wood Boring Pneumatic)

WRENCHES
Welin Davit & Boat Corp.,
305 Vernon Ave., Long Island City, N. Y.

YACHT ROPE
Plymouth Cordage Co.,
North Plymouth, Mass.
Whitlock Cordage Co.,
46 South St., New York, N. Y.



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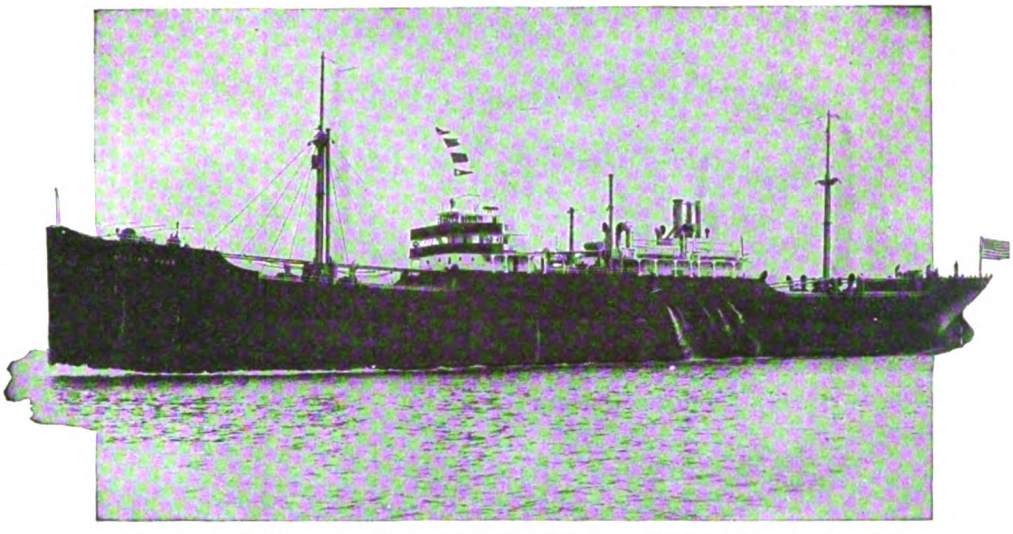

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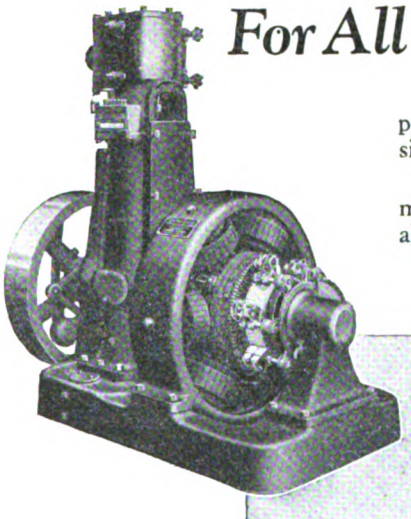

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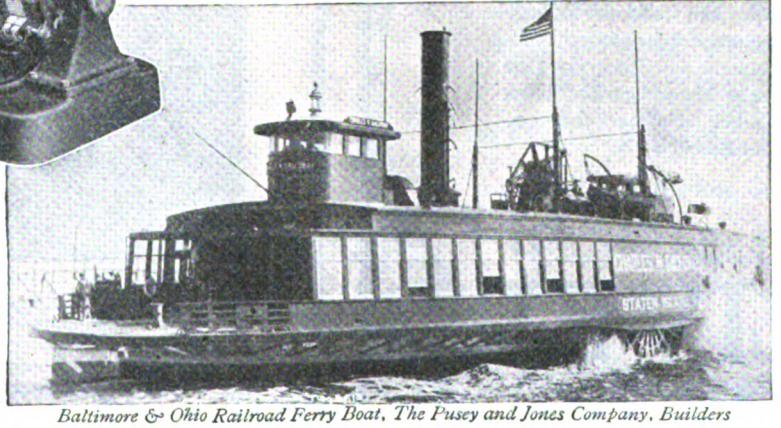

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MOTORSHIPS, 300 TO 1,500 TONS. Diesel Auxiliary Schooners. Other floating properties, engines, Boilers. Rafailovich & Company, 26 Cortlandt. New York.

FOR SALE:—WOODEN STEAMERS— American Steamer LIBERTY, Canadian Steamers ROCK FERRY and RUGEE, all Welland Canal sized and in good condition. Can be inspected at Ogdensburg, New York. Apply George Hall Corporation, Ogdensburg, N. Y.

FOR SALE:—50′ X 14′ 6″-HARBOR TUG or Supply Boat. Draft 5′, speed 8-9 miles per hour. Two cylinder Gulowsen-Grei 45 horsepower crude oil engine. Bore 9½″ x 11″ stroke, operates on Crude, Fuel, or Solar oils, distillate and kerosene. 20c per hour. 40″ x 32″ pitch propeller at 380 R.P.M. Engine, direct reversing, also has Joe's clutch built in. 40 seconds electric starting device. Separate engine and air compressor. Boat and engine new 1921—White oak construction. Sale price $3,500.00; one half of actual cost. Boat now at work and can be seen at any time. Frank J. Albright Co., La Pointe, Wis., Via Bayfield.

FOR SALE

Wooden deck scow; 65′ x 25′ x 6′.

Bargains in new crude oil marine engines, 16 H.P. to 200H.P.

New steel freight steamer; 65′ x 21′x 8′.

Canal size freight steamer.

Steel hull lake steamer; 300′ x 40′ x 24′; 2400 tons on 16 ft.; 3000 tons on 18 ft.; 260 autos. Double water bottom. Grain Class. Triple engines. Two Scotch boilers. Item No. 49.

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Iron hull freight and passenger steamer 207′ x 33′ x 18′; Sleep 76 passengers. F & A Cmpd., Two Scotch boilers. Atl. Coast delivery Item No. 863.

Wooden hull side wheel passenger steamer; 148′ x 26.5 x 9.—1000 passengers.

Steel hull freight steamer, built on Lakes 30 years ago. 274′ x 40′ x 26′. 3450 total D wt. Triple engines. Two Scotch boilers. Try offer $25,000 near New York City. Item No. 914.

Steel hull freight and passenger steamer; 180′ x 40′ x 10′. Three decks. 40 rooms. Atl. Coast delivery. Item No. 1563.

Steel hull fish tug. 65′ x 15′ x 7.5, 12″ x 12″ steam engine. Scotch boiler @ 150 pounds. Item No. 358.

Chicago Steamboat Exchange,
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Wanted

WANTED:—STEAMBOAT FOR FERRY purposes that will carry ten automobiles. Give full specifications with price. C. E. Hass, Clayton, N. Y.

Wanted

WANTED:—USED SCOTCH BOILER, 7′ x 9′ @ 140 pounds steam. Chicago Steam boat Exchange, 350 N. Clark St., Chicago, Ill.

"How Wooden Ships Are Built"

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A book packed full of useful information for the busy practical shipbuilder.

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CONTENTS

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AUCTION A PUBLIC AUCTION SALE of U.S.S. VULCAN and other craft at 10 A. M. (Eastern Standard Time) 12 December, 1923 AUCTION

The following U. S. Navy Vessels will be offered at public auction, at the Navy Yard, Norfolk, Va., on the above date:

U. S. S. VULCAN, collier (steel) launched in 1909; length, 403 feet; breadth, 53 feet; draft, 24 feet 8 inches; displacement, 11,250 tons; gross tonnage, 5,162; speed, 12.82 knots; bunker capacity, 825 tons; dead weight, 8,100 tons. Equipped with 2 vertical triple-expansion engines, 22-inch H.P., 37½ I.P., 60-inch L.P., 40-inch stroke, and 4 S.E. boilers, 235 sq. ft. total grate surface; 10,200 sq. ft. total heating surface. Indicated horsepower (main engines), 3,736. Built by Maryland Steel Co., Sparrows Point, Md. Located in the fifth naval district (navy yard), Norfolk, Va.

One SUBMARINE CHASER, No. 232, located at Norfolk, Va., under cognizance of commandant, fifth naval district, naval operating base, Hampton Roads, Va.

One COAL BARGE YC502, 110 ft. long, 30 ft. in breadth, capacity 250 tons. Built in 1918 by J. F. Meadows, New Bern, N. C.

In addition to the above sale, a sale of Navy Surplus Materials of general character, located at the Navy Yard, Norfolk, Va., and the U. S. Naval Supply Station, Hampton Roads, Va., will be held on 11 December, 1923, at 10 A. M.

Catalogs No. 538-A covers the sale of vessels on 12 December and 537-A the surplus material on 11 December, 1923, both of which may be obtained from M. Fox and Sons Company, Auctioneers, 202 Hearst Tower, Baltimore, Md., or the

CENTRAL SALES OFFICE
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Index to Advertisements

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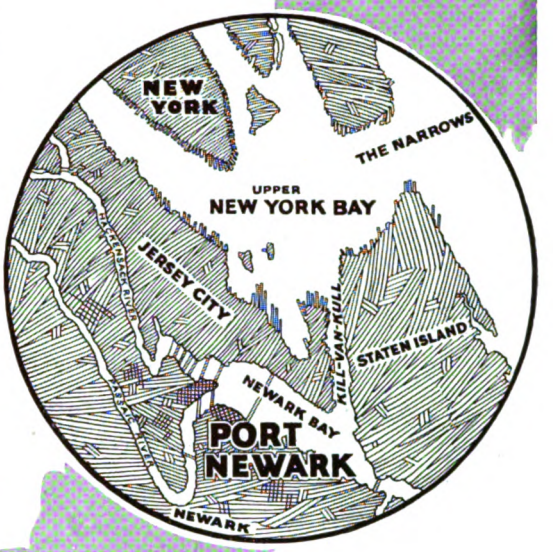
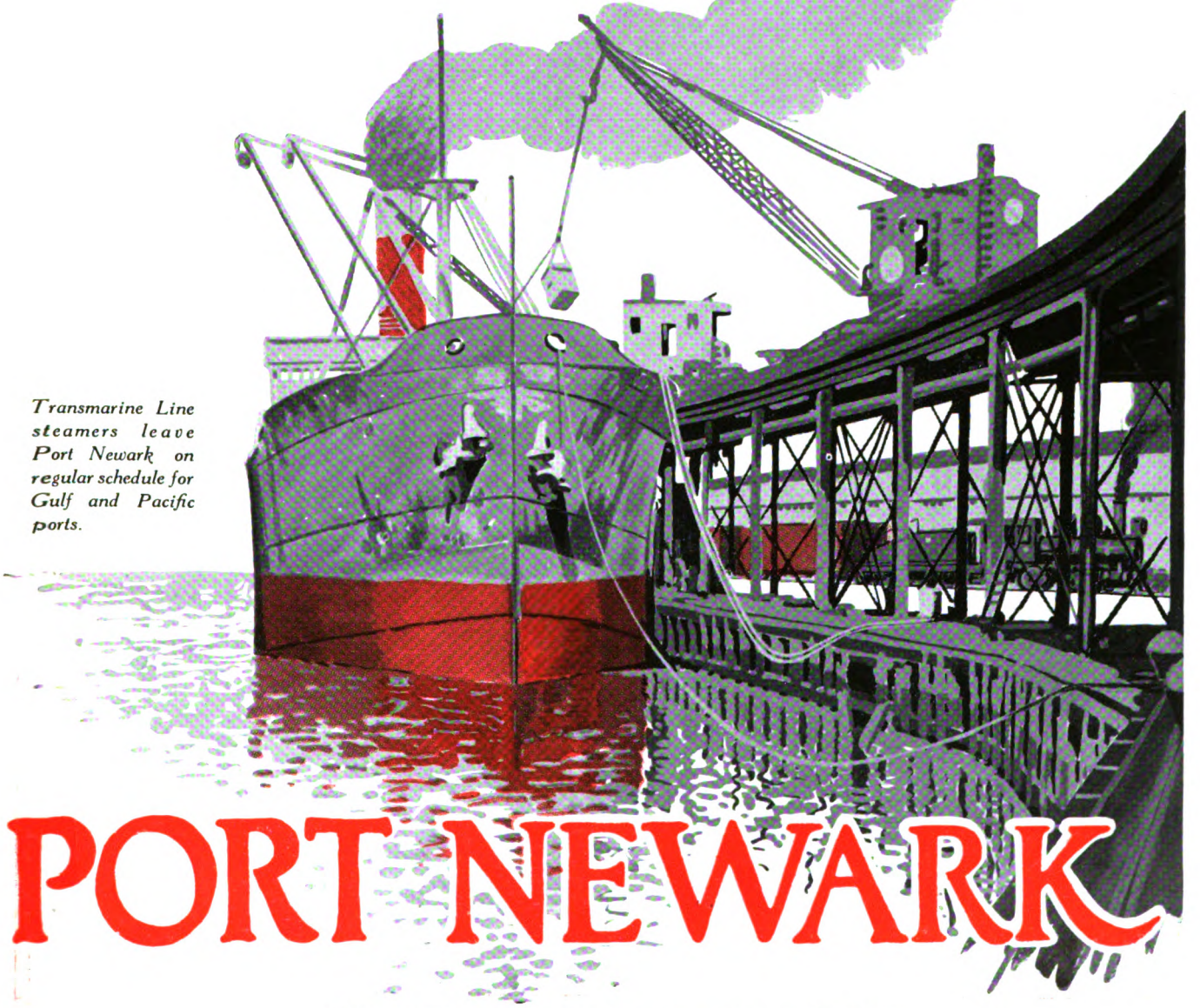
Forty per cent of the nation's commerce is handled at the Port of New York—well termed the "Gateway of America". Port Newark was developed to facilitate the handling of the products of the interior which are brought to that gateway. Shipping factors and traffic men should know all about the facilities of Port Newark, and its contiguous territory. Full information is contained in a comprehensive booklet which will be mailed free upon request.

THOS. L. RAYMOND, Director
Department of Public Improvements Newark, New Jersey





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